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Phindorea australis.



General Remarks, geographical and systematical, on the Botany of Terra Australis. By ROBERT BROWN, F. R. S. Acad. Reg. Scient. Berolin. Corresp., NATURALIST TO THE VOYAGE.

THE coasts of the great South Land commonly called New Holland have been discovered partly by Dutch and partly by English navigators. Captain Flinders, considering it therefore unjust towards the English to retain a name for the whole country which implies its discovery to have been made by the Dutch alone, has thought proper to recur to its original name Terra Australis; under which he includes the small islands adjacent to various parts of its coasts, and the more considerable southern island called Van Diemen's Land.

In this extended sense I shall use Terra Australis in the following observations, but when treating of the principal Land separately, shall continue to employ its generally received name New Holland: that I may be more readily understood by botanists, for whom these observations are intended, and preserve consistency with the title of a work, part of which I have already published on the plants of that country.

In the following pages I have endeavoured to collect such general, and at the same time strictly botanical, observations on the vegetation of Terra Australis, as our very limited knowledge of this vast country appears already to afford. To these observations are added descriptions of a few remarkable plants, which have been selected for publication, from the extensive and invaluable collection of drawings made by Mr. Ferdinand Bauer in New Holland, chiefly during the voyage of the Investigator.

The materials for the present essay were acquired principally in the same voyage, from captain Flinders's account of which a general notion of the opportunities afforded for observation may be gathered. It seems necessary, however, to present in one view the circumstances

under which our collections were formed, both in the Investigator's voyage, and subsequently, during a stay of eighteen months, in New South Wales and Van Diemen's Island; as also to state other sources from which additional materials have been obtained. By this means the reader will be better enabled to judge how far I am entitled to make those observations of a more general nature which he will find in the following pages.

The first part of New Holland examined in captain Flinders's voyage was the South Coast, on various and distant points of which, and on several of its adjacent islands we landed, in circumstances more or less favourable for our researches. The survey of this coast took place from West to East, and our first anchorage was in King George Third's Sound, in 35° S. lat. and 118° E. lon. In this port we remained for three weeks, in the most favourable season for our pursuits; and our collections of plants made chiefly on its shores and a few miles into the interior of the country, amount to nearly 500 species, exclusive of those belonging to the class Cryptogamia, which, though certainly bearing a small proportion to phænogamous plants, were not, it must be admitted, equally attended to. At our second anchorage, Lucky Bay of captain Flinders's chart, in 34° S. lat. and about 4° to the eastward of King George's Sound; we remained only three days, but even in that short time added upwards of 100 species to our former collection.

Goose-Island Bay, in the same latitude and hardly one degree to the eastward of the second anchorage, where our stay was also very short, afforded us but few new plants; and the remaining parts of the South Coast, on five distant points of which we landed, as well as on seven of its adjacent Islands, were still more barren, altogether producing only 200 additional species. The smallness of this number is to be accounted for, partly, no doubt, from the less favourable season in which this part of the coast was examined; but it appeared to depend also in a considerable degree on its greater sterility, and especially that of its islands.

Of New South Wales, or the East Coast of New Holland, scarcely any part beyond the tropic was examined in the voyage; our first landing after leaving Port Jackson being at Sandy Cape, in nearly 25° S. lat. Between this and 21° S. lat. we had many, and upon the whole, favourable opportunities for observation, especially at Port Curtis, Keppel Bay, Port

Bowen, Strong-tide Passage, Shoal-water Bay, and Broad Sound, the survey of which was completed; we landed also on two of the Northumberland and on one of the Cumberland Isles.

On the North Coast we landed on Good's Island, one of the Prince of Wales' Isles of captain Cook; for a few hours at Coen River on the east side of the Gulph of Capentaria; and in more favourable circumstances on many of the islands and some points of the mainland on the west side of this Gulph. Several of the group called the Company's Islands in the chart, the shores of Melville Bay, of Caledon Bay, and a small part of Arnhem Bay were also examined.

We then left the coast, owing to the decayed state of the ship, which, on our return to Port Jackson, was surveyed and pronounced unfit for the prosecution of the voyage.

Captain Flinders having, in consequence of this, determined to repair immediately to England, for the purpose of obtaining another vessel to complete the objects of the expedition; Mr. Bauer and myself agreed to remain in the colony of New South Wales, until his return, or, if that should not take place, for a period not exceeding eighteen months. During this time we added very considerably to our collections of plants, within the limits of the Colony of Port Jackson and its dependent settlements; the banks of the principal rivers and some part of the mountains bounding the colony were examined; I visited also the north and south extremities of Van Diemen's Land, remaining several months in the vicinity of the river Derwent; and repeatedly landed on Kent's Islands, in Bass' Strait, on the shores of which the principal part of the Submarine Algæ contained in our collections were found.

The reader of captain Flinders's narrative is already acquainted with the unfortunate circumstances that prevented his revisiting Port Jackson within the expected period, soon after the expiration of which we embraced an opportunity of returning to England, where we arrived in October 1805, with the greater part of our collections, and without having absolutely lost any one species; though many of our best specimens of the South Coast, and all the living plants collected in the voyage perished in the wreck of the Porpoise.

The collection of Australian plants thus formed amounts to nearly 3900 species. But before embarking in the voyage of captain Flinders, I

enjoyed no common advantages, through the liberality of Sir Joseph Banks, in whose Herbarium I had not only access to nearly the whole of the species of plants previously brought from Terra Australis, but received specimens of all those of which there were duplicates. Of these plants, exceeding 1000 species, the far greater part were collected by Sir Joseph Banks himself, in the voyage in which New South Wales was discovered. The rest were found at Adventure Bay in Van Diemen's Land, by Mr. David Nelson, in the third voyage of captain Cook; at King Georges's Sound on the south-west coast of New Holland, by Mr. Menzies, in captain Vancouver's voyage; and in the colony of New South Wales by several botanists, especially the late colonel Paterson and Mr. David Burton. Since my return from New Holland I have had opportunities of examining, in the same Herbarium, many new species, found in New South Wales by Mr. George Caley, an acute and indefatigable botanist, who resided nearly ten years in that colony: and have received from the late colonel Paterson several species discovered by himself within the limits of the colony of Port Dalrymple; which was established under his command.

I have also examined, in the Sherardian Herbarium at Oxford, the greater part of the plants brought from Shark's Bay by the celebrated navigator Dampier, and have seen a few additional species from that and other parts of the West Coast of New Holland, collected in the voyage of captain Baudin.

The additional species obtained from all these collections are upwards of 300; my materials, therefore, for the commencement of a Flora of Terra Australis amount to about 4200 species; a small number certainly for a country nearly equal in size to the whole of Europe, but not inconsiderable for the detached portions of its shores hitherto examined.

In Persoon's Synopsis, the latest general work on phænogamous plants, their number is nearly 21000. The cryptogamous plants already published, by various authors, exceed 6000; and if to these be added the phænogamous plants that have appeared in different works since the publication of Persoon's Synopsis, and the unpublished species of both classes already existing in the collections of Europe, the number of plants at present known may be estimated at 33000, even exclusive of those peculiar to Terra Australis.

The observations in the present essay being chiefly on extensive

tribes of plants they are necessarily arranged according to the natural method.

Of this method the primary classes are DICOTYLEDONES, MONOCOTYLEDONES, and ACOTYLEDONES.

These three divisions may be admitted as truly natural, and their names, though liable to some exceptions, appear to me the least objectionable of any hitherto proposed.

Of the Australian plants at present known, upwards of 2900 are Dicotyledonous ; 860 Monocotyledonous ; and 400 Acotyledonous, Ferns being considered as such.

It is well known that Dicotyledonous plants greatly exceed Monocotyledonous in number ; I am not however aware that the relative proportions of these two primary divisions have any where been given, or that it has been enquired how far they depend on climate. Into this subject I can enter only very generally in the present essay. According to the numbers already stated the Dicotyledones of Terra Australis are to the Monocotyledones as rather more than 3 to 1, or somewhat less than 7 to 2.

In Persoon's Synopsis, to which, as the latest general work, I again refer, these two classes are to each other nearly as 11 to 2. But, from the nature of this compilation, it may be assumed that certain difficult and extensive orders of Monocotyledones, especially Gramineæ and Cyperaceæ, are considerably under-rated ; an addition of 500 species to Monocotyledones would make the relative numbers of the two classes as 9 to 2, which I am inclined to think an approximation to the true proportion.

With a view to determine how far the relative proportions of these two classes are influenced by climate, I have examined all the local catalogues or Floras which appeared most to be depended on, and have likewise had recourse to unpublished materials of great importance in ascertaining this point. The general results of this examination are, that from the equator to 30° of latitude, in the northern hemisphere at least, the species of Dicotyledonous plants are to Monocotyledones as about 5 to 1 ; in some cases considerably exceeding, and in a very few falling somewhat short of this proportion ; and that in the higher latitudes a gradual dimi-

nution of Dicotyledones takes place, until in about 60° N. lat and 55° S. lat. they scarcely equal half their intratropical proportion.

In conformity with these results the Dicotyledones should be to the Monocotyledones of Terra Australis as nearly 9 to 2; whereas the actual proportion as deduced from our materials is hardly 7 to 2: but it appears, on arranging these materials geographically, that the relative proportions of the different regions of Terra Australis itself, are equally at variance with these results. About half the species of Australian plants at present known have been collected in a parallel included between 33° and 35° S. lat.; for this reason, and for one which will hereafter appear, I shall call this the *principal parallel*. At the eastern extremity of this parallel, within the limits of the colony of Port Jackson, where our materials are the most perfect, the proportion of Dicotyledones to Monocotyledones does not exceed 3 to 1. At the western extremity of the same parallel, in the vicinity of King George's Sound, the proportion is but little different from that of Port Jackson, being nearly as 13 to 4. At the south end of Van Diemen's Island in 43° S. lat., it is fully 4 to 1. And with this proportion that of Carpentaria, and I may add the whole of the æquinoctial part of New Holland, hitherto examined, very nearly agrees.

I confess I can perceive nothing, either in the nature of the soil or climate of Terra Australis, or in the circumstances under which our collections were formed, to account for these remarkable exceptions to the general proportions of the two classes in the corresponding latitudes of other countries.

With regard to the proportion of Acotyledones in Terra Australis, it is necessary to premise that I consider my collections of some of the Cryptogamous orders, especially of Fungi, as very imperfect. If, however, 300 species were added to the 400 actually collected, I believe it would give an approximation to the true proportions, which on this supposition, would be of Phænogamous to Cryptogamous plants as nearly 11 to 2. But the general proportion of these two great divisions, as deduced from the published materials, is very different from this, being nearly 7 to 2.

If we enquire in what degree these proportions are dependent on climate, we find that in the more northern parts of Europe, as in Lapland and even in Great Britain, Cryptogamous plants somewhat exceed the Phæ-

nogamous in number. In the south of Europe, even making allowance for its being at present less perfectly examined, these proportions seem to be inverted. And within the tropic, unless at very great heights, Cryptogamous plants appear to form hardly one-fifth of the whole number of species. But their proportion in Terra Australis is still smaller than the assumed intratropical proportion: for this, however, in the northern parts of New Holland at least, the comparative want of shade and moisture, conditions essential to the vegetation of several of these tribes, will in some measure account; for at the southern extremity of Van Diemen's Island, where the necessary conditions exist, the relative proportion of Cryptogamous plants is not materially different from that of the south of Europe.

In that which I have called the principal parallel of New Holland, however, Cryptogamous plants appear to be much less numerous than in the corresponding latitudes of the northern hemisphere; and within the tropic they probably do not form more than one-twelfth of the whole number of species.

In several of the islands of the Gulph of Carpentaria, having a Flora of Phanogamous plants exceeding 200 species, I did not observe a single species of Moss.

From the three primary classes of plants already treated of I proceed at once to those groups called NATURAL ORDERS or Families; for the intermediate divisions are too much at variance with the natural series to be made the subject of such general remarks as have been already offered on the primary classes, and which are equally admissible with respect to the natural families.

A methodical, and at the same time a natural, arrangement of these families is, in the existing state of our knowledge, perhaps impracticable. It would probably facilitate its future attainment, if at present, entirely neglecting it, attention were turned to the combination of these orders into Classes equally natural, and which, on a thorough investigation, might equally admit of being defined. The existence of certain natural classes is already acknowledged, and I have, in treating of the Australian natural families, ventured to propose a few that are perhaps less obvious, still more however might have been suggested had this been the place for pursuing the subject.

The natural orders in the *Genera Plantarum* of Jussieu are exactly 100 ; subsequent observations of Jussieu himself and of other botanists have considerably encreased their numbers, so that in the lately published *Théorie Élémentaire de la Botanique* of Decandolle they amount to 145.

The plants of Terra Australis are referable to 120 natural orders, some of which are not included in Decandolle's list.

On such of these as either contribute largely to form the mass or the striking peculiarities of the Australian vegetation, I proceed to offer a few observations, chiefly on their geographical distribution, and more remarkable points of structure: taking them nearly in the same series in which they are given by Decandolle in the work already referred to.

MALVACEÆ. The Malvaceæ may be considered as a class including several orders, namely, *Malvaceæ* of Jussieu,* *Sterculiaceæ* of Ventenat,† *Chlenaceæ* of Du Petit Thouars,‡ *Tiliaceæ* of Jussieu,§ and an order very nearly related to the last, and perhaps gradually passing into it, but which I shall, in the mean time, distinguish under the name of *Buttneriaceæ*.

Of the *Malvaceæ* strictly so called, upwards of fifty species have been observed in Terra Australis, where the maximum of the order appears to be within the tropic. In the principal parallel *Malvaceæ* are more abundant at its eastern than its western extremity ; and at the south end of Van Diemen's Island two species only have been observed. There is nothing very peculiar in the structure or appearance of the New Holland plants of this family ; most of them belong to genera already established, and several of the species are common to other countries.

BUTTNERIACEÆ. ¶ The Australian portion of *Buttneriaceæ*

* *Gen. pl.* 271.

† *Malmais.* 91.

‡ *Plant. des isles d'Afrique*, 46.

|| *Gen. pl.* 289.

¶ **BUTTNERIACEÆ.** *Calyx* 1-ph. 5-fid. æqualis, marcescens, æstivatione valvata. *Petala* 5 : vel basi saccata superne variè producta ; vel minuta squamuliformia ; quandoque nulla. *Stamina* hypogyna, definita : *Filamenta antherifera* cum laciniis calycis alternantia, simplicia, vel 2-3 connata ; *sterilibus* quandoque alternantibus. *Ovarium* 3-5-loculare, loculis 2-polyspermis, ovulis erectis : *Styli* 3-5, sæpius connati : *Stigmata*

consists of *Abroma*, *Commersonia*, *Lasiopetalum*, and several unpublished genera, intermediate to the two last.

The greater part of the order exists in the principal parallel, very few species have been observed within the tropic, and one only in Van Diemen's Island.

Lasiopetalum, the most extensive genus of the family, was established by Dr Smith,* who considered it to belong to *Ericææ*. Ventenat† taking a different view of its structure, has assigned some plausible reasons for referring it to *Rhamneæ*. From both these orders it appears to me sufficiently distinct, and it is certainly more nearly related to the genera with which I have placed it.

DILLENiaceæ. It was first, I believe, proposed by Mr. Salisbury to separate *Dillenia*, *Wormia*, *Hibbertia*, and *Candollea* from the *Magnoliæ* of Jussieu, and to form them into a distinct order, which he has called *Dilleneæ*.‡ It is remarkable that Decandolle,§ who has adopted this order, should also limit it to these genera, Jussieu|| having previously suggested the separation of *Dillenia* from *Magnoliæ* and its combination with *Tetracera* and *Curatella*, genera which certainly belong to *Dilleniaceæ*, as do also *Pleurandra* of Labillardiere¶ and *Hemistemma* of Du Petit Thouars.**

The *Dilleniaceæ* appear to be more abundant in *Terra Australis* than in any other part of the world, nearly 70 Australian species having already been observed; most of these belong to *Hibbertia* and *Pleurandra*, both of which are very generally diffused, their maximum, however, is in the principal parallel, to the western extremity of which *Candollea* seems to be limited. *Hemistemma*, *Wormia*, and an unpublished genus remarkable

simplicia. Capsula 3-5-loc. Semina: umbilico strophiolato. Embryo erectus, in axi albuminis carnosius ejus dimidio longior. Frutices raro Arbores, pube sæpe stellari. Folia alterna, simplicia, stipulata, sæpius dentata. Pedunculi subcymosi, oppositifolii; pedicellis ut plurimum bracteatis.

* *Linn. soc. transact.* 4, p. 216.

† *Malmais.* 59. *Dec. gen. nov.* p. 7.

‡ *Paradis. Lond.* 73.

§ *Annales du mus.* 17, p. 400.

|| *Annales du mus.* 14. pp. 129-130.

¶ *Plant. Nov. Holl.* 2. p. 5.

** *Gen. nov. Madagasc.* n. 61.

for its thickened filaments and flat leafless stems, are found only within the tropic. The remaining genera of the order have not yet been observed in New Holland.

Magnoliaceæ and Dilleniaceæ appear to me to form two orders of one natural class. These orders are sufficiently distinct from each other in most cases, both in fructification and habit; they are not, however, easily defined. The ovaria, which are indefinite in number in the greater part of Magnoliaceæ, are also so in certain Dilleniaceæ; there are likewise examples in both orders, in which they are reduced to unity; and the stipulation of Magnoliaceæ exists in Wormia.

PITTOSPOREÆ.* Authors have generally been disposed to consider Pittosporum, Bursaria, and Billardiera, as belonging to Rhamnæ or Celastrinæ, from both of which they are certainly widely different; and they appear to me to constitute, along with some unpublished Australian genera, a very distinct natural family. PITTOSPOREÆ form a small tribe chiefly belonging to Terra Australis, where most of them have been observed in the principal parallel; but certain species of all the published genera exist at the south end of Van Diemen's Island, and both Pittosporum and Bursaria are found within the tropic. Pittosporum, the only genus of the order which is not confined to Terra Australis, has the most extensive range in that country, and has been found in many other parts of the world, namely, New Zealand, Norfolk Island, the Society and Sandwich Islands, the Moluccas, in China, Japan, and even Madeira. It has not, however, been observed in any part of America.

POLYGALEÆ.† The curious observation of Richard, that the arillus

* PITTOSPOREÆ. *Calyx* 5-ph. (rarò 1-ph. 5-fid.) æstivatione imbricata. *Petala* 5: unguibus conniventibus, nunc cohærentibus; laminis patulis, æstivatione imbricatis. *Stamina* 5, hypogyna, distincta cum petalis alternantia. *Ovarium* loculis placentisve 2-5 polyspermis: *Stylus* 1: *Stigmata* numero placentarum. *Pericarpium* capsulare vel baccatum, loculis polyspermis quandoque incompletis. Embryo minutus, prope umbilicum, inclusus albumine carnosò. Frutices *vel* Arbores. Folia *simplicia*, *alterna*, *exstipulata*. Flores *terminales vel axillares*, *quandoque polygami*.

† POLYGALEÆ. *Calyx* 5-ph. rarò 5-fid. æstivatione imbricata: sæpius irregularis: fo-

of the seed, whether general or partial, is never found in the Dicotyledonous orders with monopetalous flowers, seems to have determined Jussieu* and other French botanists to remove *Polygala*, remarkable for its *caruncula umbilicalis*, from *Rhinanthaceæ* with which they had placed it, and to consider it, along with some nearly related genera, as forming a distinct polypetalous order. They appear to me however, not to have taken so correct a view of the structure of its Corolla as Adanson,† who very justly observes that both in this genus and *Securidaca*, which he rightly associates with it, the apparently monopetalous corolla is made up of three petals, united by means of the cohering filaments, the external sutures remaining visible; but Adanson himself has not observed the minute rudiments of two additional petals in *Securidaca*, the existence and position of which assist in explaining the nature of the irregularity in *Polygala*, where no such rudiments are found, but in which the corolla is in every other respect very similar. A much nearer approach to regularity, however, takes place in an unpublished genus, having 5 petals, which, though irregular, are of nearly equal size and similarly connected by the cohering filaments, likewise 5 in number. The essential characters of the order *Polygaleæ* to which *Krameria*, *Monnina*, *Salomonina*, and several unpublished genera also belong, consist in the hypogynous insertion of its corolla, which is always irregular, and frequently reduced to 3 petals, connected together by the cohering filaments, whose antheræ are simple and bursting only at the top.

About 30 species of this order are found in *Terra Australis*; these are either *Comespermæ* or *Polygalæ*, with a single species of *Salomonina* of

liolis 2 lateralibus interioribus majoribus quandoque petaloideis; reliquorum duobus anterioribus (respectu spicæ) tertio postico. *Petala* 3-5, mediante tubo stamineo connexa, rarò distincta. *Stamina* hypogyna, 8 (nunc 3-4 vel 5): filamentis infernè connatis in tubulum hinc apertum inde petala connectentem: *Antheræ* simplices, basi insertæ, poro apicis dehiscentes. *Ovarium* 2-loc. (quandoque 1-3 loc.) ovulis solitariis pendulis: *Stylus* 1: *Stigma* sæpe bilabiatum. *Pericarpium* sæpius capsulare, biloculare, bivalve, valvis medio septigeris: nunc *Drupa* vel *Samara*. 1-2-sperm. *Semina* pendula, umbilico (in capsularibus) strophiolato vel comoso. *Embryo* in axi albuminis carnosì vix longioris, quandoque (præsertim in pericarpis clausis) deficientis. *Herbæ vel Frutices, ut plurimum glabri. Folia simplicia indivisa alterna exstipulata. Flores spicati sæpius terminales.*

* *Annales du mus.* 14. p. 386. et seq.

† *Fam. des Plantes.* 2, p. 348.

Loureiro, a genus which is certainly not monandrous, as that author affirms, but has four connected filaments with distinct unilocular antheræ, and consequently half the number of stamina usually found in the order. Most of the *Comespermæ* exist in the principal parallel, and equally at both its extremities ; several, however, are found beyond it, and in both directions ; the genus extending from Arnhem's Land to Adventure Bay. The greater part of the *Polygalæ* and the genus *Salomonina* exist only within the tropic.

TREMANDREÆ.* The genus *Tetratheca* of Dr. Smith and one very nearly related to it, which I shall hereafter publish under the name of *Tremandra*, constitute a small tribe of plants peculiar to Terra Australis. For this tribe I prefer the name *Tremandreæ* to that of *Tetrathecaceæ*, as it is more distinctly, and at the same time more correctly descriptive of the structure of stamina in both genera ; the four distinct cells in the ripe state of the antheræ not existing in *Tremandra*, nor even in all the species of *Tetratheca*. In the quadrilocular antheræ of the latter genus there is indeed nothing peculiar, that being the original structure of all those antheræ which are commonly described as bilocular ; and the difference in this case depending on the mode of bursting, which when lateral, necessarily obliterates two of the septa, but when terminal, as in *Tetratheca*, admits of their persistence. It is remarkable that both Dr. Smith and Labillardiere have mistaken the fungous appendix of the apex of the seed for an umbilical caruncula, a mistake involving a second, that of considering the seeds erect in the capsule, and which has led Labillardiere into a third error, namely, describing the radicle of the embryo as pointing towards this supposed umbilical appendix.

* **TREMANDREÆ.** *Calyx* 4-5-ph. æqualis, æstivatione valvata. *Petala* 4-5, æqualia : æstivatione involuta stamina includentia. *Stamina* 8-10, hypogyna, distincta : *Antheræ* 2-4-loculares, basi insertæ, poro tubulove apicis dehiscentes. *Ovarium* 2-loc. loculis 1-3-spermis, ovulis pendulis : *Stylus* 1 : *Stigmata* 1-2. *Capsula* bilocularis, bivalvis, valvis medio septigeris. *Semina* umbilico nudo : extremitate opposita appendiculata ; albuminosa. *Embryo* in axi albuminis carnosi cujus dimidio longior : *radicula* umbilicum spectante. Fruticuli *ericoides*. Folia *sparsa vel verticillata, exstipulata*. Pedunculi *axillares, uniflori*.

The Tremandreae are in several respects nearly related to Polygaleae; they appear to me however sufficiently distinct, not only in the regularity of the flower, and in the structure of antherae, but in the aestivation of both calyx and corolla, in the appendix of the seed being situated at its apex, and not at the umbilicus, and, I may also add, in a tendency to produce an indefinite number of ovula in each cell of the ovarium.

The greater number of Tremandreae are found in the principal parallel of New Holland, they extend also to the south end of Van Diemen's Island, but none have been observed within the tropic.

DIOSMEÆ. To this natural order, in addition to the Australian genera hereafter to be mentioned, and the south African genus from which its name is derived, I refer *Fagara*, *Zanthoxylon*, *Melicope*, *Jambolifera*, *Euodia*, *Pilocarpus*, *Empleurum*, and *Dictamnus*: and four genera of æquinoctial America, namely, *Cusparia* of Humboldt and Bonpland, *Ticorea* and *Galipea* of Aublet, and *Monniera*, if not absolutely of this order, belong at least to the same natural class.

Both *Ruta* and *Peganum* may be annexed to Diosmeæ, but neither of them are calculated to give a clear idea of the order, from the usual structure and habit of which they deviate in some important points; I have therefore proposed to derive the name of the family from one of its most extensive and best known genera. The first section of Jussieu's Rutaceæ is sufficiently different to admit of its being considered a distinct order, which may be named *Zygophylleæ*.

Diosmeæ are numerous in Terra Australis, and form, at least in its principal parallel and more southern regions, a striking feature in the vegetation. Nearly 70 species have been observed, of which the greater part are referable to *Boronia*, *Correa*, *Eriostemon*, and *Zieria*, of Dr. Smith, and *Phebalium* of Ventenat. Of these genera *Boronia* is both the most extensive and the most widely diffused, existing within the tropic, and extending to the South end of Van Diemen's Island; like the others, however, its maximum is in the principal parallel, at both extremities of which it is equally abundant. *Correa*, though extending to the south end of Van Diemen's Island, is not found within the tropic, nor was it observed at the western extremity of the principal parallel; in the intermediate part of

which, however, where many of the peculiarities in the vegetation of the parallel are less remarkable, or entirely wanting, it may be said to abound.

Eriostemon, which appears to be most abundant at the eastern extremity of the principal parallel, has not been observed either at its western extremity or intermediate part; it extends, however, to the south end of Van Diemen's Island on the one hand, and within the tropic as far as Endeavour River on the other.

Phabalium, very nearly related to *Eriostemon*, has like that genus its maximum at the eastern extremity of the principal parallel, it is found also at the western extremity of this parallel, and as far as the south end of Van Diemen's Island, but it has not been observed within the tropic.

Zieria seems to be limited to the eastern extremity of the principal parallel, and the more southern regions.

The most remarkable plant of the order with regard to structure, is that imperfectly figured and described in Dampier's voyage.* Of this genus, which may be named *DIPLOLÆNA*, I have examined Dampier's original specimen in the Sherardian Herbarium at Oxford, and others recently collected, also at Shark's Bay, in the voyage of captain Baudin, and have ascertained that what appear to be calyx and corolla in this singular plant, are in fact a double Involucrum containing many decandrous flowers, whose Stamina and Pistilla exactly agree with those of the order, but of which the proper floral envelopes are reduced to a few irregularly placed scales.

Another Australian genus of Diosmeæ differs from the rest of the order in having a calyx with ten divisions, an equal number of petals, and an indefinite number of stamina with evidently perigynous insertion.

MYRTACEÆ.† This is one of the most extensive tribes in Terra Australis, in which considerably above 200 species have already been observed, and where the order is also more strikingly modified than in any other part of the world. It is very generally spread over the whole of Australia, but its maximum appears to be in the principal parallel: Many observations might here with propriety be introduced on the more remarkable structures which occur among the Australian Myrtaceæ; I must

* Vol. 3, p. 110, tab. 3, f. 3.

† Myrti. *Juss. gen.* 322.

however, confine myself to a few remarks on the distribution of the most extensive genera.

Of *Eucalyptus* alone nearly 100 species have been already observed, most of these are trees, many of them of great and some of enormous dimensions. *Eucalyptus globulus* of Labillardiere and another species peculiar to the south end of Van Diemen's Island, not unfrequently attain the height of 150 feet, with a girth near the base of from 25 to 40 feet. In the colony of Port Jackson there are also several species of great size, but none equal to those of Van Diemen's Island : and no very large trees of this genus were seen either on the south coast or in the æquinoctial part of New Holland. Mr. Caley has observed within the limits of the colony of Port Jackson nearly 50 species of *Eucalyptus*, most of which are distinguished, and have proper names applied to them, by the native inhabitants, who from differences in the colour, texture, and scaling of the bark, and in the ramification and general appearance of these trees, more readily distinguish them than botanists have as yet been able to do. *Eucalyptus*, although so generally spread over the whole of Terra Australis, and so abundant as to form at least four-fifths of its forests, is hardly found beyond this country. I am acquainted with one exception only, in an additional species which is said to be a native of Amboyna.

Next to *Eucalyptus* in number, is the beautiful genus *Melaleuca*, of which upwards of 30 Australian species have already been observed, exclusive of *Tristania*, *Calothamnus*, *Beaufortia*, and an unpublished genus which I separate from it. The maximum of *Melaleuca* exists in the principal parallel, but it declines less towards the south than within the tropic, where its species are chiefly of that section which gradually passes into *Callistemon*, a genus formed of those species of *Metrosideros* that have inflorescence similar to that of *Melaleuca*, and distinct elongated filaments. With the exception of two species of this section, namely, *Melaleuca Leucadendron*, and *M. Cajeputi*, the genus *Melaleuca* appears to be confined to Terra Australis.

Leptospermum, of which, nearly 30 Australian species have been observed, exists also in New Zealand and in the Moluccas. In Terra Australis its maximum is decidedly in the principal parallel, and like *Melaleuca*, it is much more abundant in the southern regions than within the tropic.

Bækia, to which I refer *Imbricaria* of Dr. Smith, as well as the opposite-leaved *Leptospermums*, is also an extensive Australian genus, having its maximum in the principal parallel, extending like the two former genera to the highest southern latitude, and hardly existing within the tropic: one species, however, has been found in New Caledonia, and that from which the genus was formed is a native of China.

COMBRETACEÆ.* I have formerly† made some remarks on the structure and limits of Combretaceæ, one of whose principal characters consists in the unilocular ovarium with two or more ovula simply pendulous from the upper part of its cavity, and not inserted, as in Santalaceæ, into a central receptacle or column. Guiera of Jussieu, having the same structure, and also leaves dotted with pellucid glands, appears to connect this order with Myrtaceæ.

The Australian Combretaceæ, which belong to Terminalia, Chuncoa, and Laguncularia, are not numerous, and all of them are found within the tropic.

CUNONIACEÆ‡. This order, several of whose genera have been referred to Saxifrageæ, is more readily distinguished from that family by its widely different habit, than by any very important characters in its fructifi-

* COMBRETACEÆ. *Calyx* superus: limbo 4-5-fido, æquali. *Petala* 4-5. vel nulla. *Stamina* 8-10; quandoque laciniis calycis æqualia et cum iisdem alternantia. *Ovarium* uniloculare, ovulis 2-4, ab apice loculi pendulis absque receptaculo communi vel columna centrali: *Stylus* 1: *Stigma* 1. *Pericarpium* monospermum, clausum, figura et textura variuin, Drupa v. Samara. *Semen* exalbuminosum. *Embryo* cotyledonibus sæpius involutis: plumula inconspicua.

Arbores vel Frutices. Folia *simplicia, integra, exstipulata, alterna nunc opposita, raro punctato-pellucida*. Flores *spicati, axillares*.

† *Prodr. fl. nov. Holl.* 351.

‡ CUNONIACEÆ. *Calyx* 1-ph. 4-5-fidus, semisuperus vel inferus. *Petala* 4-5; raro nulla. *Stamina* perigyna, definita, 8-10. *Ovarium* biloculare, loculis 2-polyspermis: *Stylus* 1-2. *Pericarpium* biloculare, capsulare vel clausum. *Embryo* in axi albuminis carnosus.

Arbores vel Frutices. Folia *opposita, composita vel simplicia, sæpius stipulata stipulis interpetiolaribus*.

cation ; like Saxifrageæ also it comprehends genera with ovarium superum and inferum.

The genera strictly belonging to *Cunoniaceæ* are *Weinmannia*, *Cunonia*, *Ceratopetalum*, *Calycomis*, and *Codia*. To this order *Bauera* may also be referred, but it must form a separate section from the genera already mentioned. Of these *Weinmannia*, *Ceratopetalum*, and *Calycomis* are found in Terra Australis, and hitherto, only at the eastern extremity of its principal parallel, where also *Bauera* is most abundant ; but this genus is found beyond the parallel in one direction, extending to the southern extremity of Van Diemen's Island.

RHIZOPHOREÆ.* The genera *Rhizophora*, *Bruguiera*, and *Carallia*, all of which are found in the æquinoctial part of New Holland, form a distinct natural order which may be called *Rhizophoreæ*. This order agrees with *Cunoniaceæ* in its opposite leaves and intermediate stipulæ, and with great part of them in the æstivation of its calyx, and in the structure and cohesion of the ovarium. From these it differs chiefly in the want of Albumen and greater evolution of its Embryo. Jussieu† has combined *Rhizophora* and *Bruguiera* with *Loranthus* and *Viscum*, neglecting some very obvious, and, as they appear to me, important differences in the flower, and probably never having had an opportunity of comparing the very distinct structures of their ovaria ; the affinity too of *Rhizophoreæ* to *Cunoniaceæ* is unquestionable, and it will hardly be proposed to unite both these tribes with *Loranthus*, which I consider as even more nearly related to *Proteaceæ*.

HALORAGEÆ. The greater part of the genera of which this order is composed, have been referred to *Onagraceæ*, to certain parts of which they no doubt very nearly approach ; but it must appear rather paradoxical to unite *Fuchsia* in the same family with *Myriophyllum* and even *Hippuris*,

* RHIZOPHOREÆ. *Calyx* superus, 4-5-fidus, æstivatione valvata. *Petala* 4-5. *Stamina* perigyna, 8-15. *Ovarium* 2-loc. loculis 2-polyspermis ovulis pendulis : *Stylus* 1. *Pericarpium* clausum, monospermum. *Semen* exalbuminosum. *Embryo* sæpe germinans et pericarpium semisuperum perforans.

Arbores. Folia opposita, simplicia, stipulis interpetiolaribus.

† *Annales du mus.* 12. p. 283.

and it would be in vain to attempt a definition of an order composed of such heterogeneous materials. By the separation of the order here proposed it becomes at least practicable to define Onagrariæ. It is still however, difficult to characterise Halorageæ, which will probably be best understood by considering as the type of the order the genus *Haloragis*, from which all the others differ by the suppression of parts or separation of sexes. Thus *Meionectes*, an unpublished genus of New Holland, is reduced to half the number of parts both of flower and fruit. *Proserpinaca* is deprived of petals and of one fourth of all the other parts. *Myriophyllum*, which is monœcious, has the complete number of parts in the male flower, but in the female wants both calyx and corolla; what several authors have described as petals being certainly bractææ.

Serpicula differs from *Myriophyllum* in having only half the number of stamina in the male flower, and in its unilocular four-seeded ovarium.

Hippuris, though retaining the habit of *Myriophyllum*, yet having a monandrous hermaphrodite flower without petals, and a single-seeded ovarium, is less certainly reducible to this order: and it may appear still more paradoxical to unite with it *Callitriche*, in which, however, I am inclined to consider what authors have denominated petals as rather analogous to the bractææ in the female flower of *Myriophyllum* and *Serpicula*, and to both these genera *Callitriche* in the structure of its pistillum, and even in habit very nearly approaches.

The Australian genera of this order are *Haloragis*, *Meionectes*, *Myriophyllum*, and *Callitriche*.

Of *Haloragis*, many new species have been observed in Terra Australis, in every part of which this genus is found, most abundantly however at both extremities of the principal parallel.

That *Gonocarpus* really belongs to the same genus, I am satisfied from an examination of original specimens sent by Thunberg himself, to Sir Joseph Banks, for in these I find not only petals, but eight stamina and a quadrilocular ovarium.

LEGUMINOSÆ.* This extensive tribe may be considered as a class divisible into at least three orders, to which proper names should be

* *Juss. gen.* 345.

given. Of the whole class about 2000 species are at present published, and in Terra Australis, where this is the most numerous family, considerably more than 400 species have already been observed.

One of the three orders of Leguminosæ which is here for the first time proposed may be named MIMOSÆ. It consists of the Linnean *Mimosa*, recently subdivided by Willdenow into five genera, along with *Adenanthera* and *Prosopis*.

This order is sufficiently distinguished from both the others by the hypogynous insertion and valvular æstivation of its corolla, which being perfectly regular differs in this respect also from the greater part of Lomentaceæ and from all the Papilionaceæ.

Nearly the whole of the Australian species of the Linnean genus *Mimosa* belong to *Acacia* of Willdenow, as it is at present constituted; and about nine-tenths of the *Acaciæ* to his first division of that genus, described by him as having simple leaves, but which is in reality aphyllous; the dilated foliaceous footstalk performing the functions of the true-compound leaf, which is produced only in the seedling plant, or occasionally in the more advanced state in particular circumstances, or where plants have been injured.

The great number of species of *Acacia* having this remarkable œconomy in Terra Australis forms one of the most striking peculiarities of its vegetation. Nearly 100 species have already been observed; more than half of these belong to the principal parallel, at both extremities of which they appear to be equally abundant; they are however very generally diffused over the whole country, existing both on the north coast of New Holland, and at the south end of Van Diemen's Island. But though the leafless *Acaciæ* are thus numerous and general in Terra Australis, they appear to be very rare in other parts of the world; none of the Australian species are found in other countries, and at present I am acquainted with only seven additional species, of which five are natives of the intratropical Islands of the Southern hemisphere; the sixth was observed in Owhyhee, and is said to be the largest tree in the Sandwich Islands; the seventh is *Mimosa stellata* of Loureiro, upon whose authority it entirely rests.

The second order, LOMENTACEÆ or CÆSALPINEÆ, comprehends all the genera having perigynous stamina, a corolla whose æstivation is not

valvular, and which though generally irregular is never papilionaceous. To these characters may be added the straight Embryo, in which they agree with Mimoseæ, but differ from all the Papilionaceæ except *Arachis* and *Cercis*.

The Lomentaceæ of New Holland are not numerous, and consist chiefly of the genus *Cassia*, the greater part of whose species grow within the tropic. On the east coast they probably do not extend beyond 35° lat.; and on the south coast only one species has been observed, it was found in 32° S. lat. and is remarkable in being aphyllous, with dilated footstalks exactly like the *Acaciæ* already noticed.

The third order, PAPILIONACEÆ, which comprehends about three-fourths of the whole class at present known, includes also nearly the same proportion of the Australian Leguminosæ.

Papilionaceæ admit of subdivision into several natural sections, but in *Terra Australis* they may be divided almost equally, and without violence to natural affinities, into those with connected and those with distinct stamina.

The decandrous part of the whole order bears a very small proportion to the diadelphous, which in Persoon's synopsis is to the former as nearly 30 to 1, while in *Terra Australis*, as I have already stated, the two tribes are nearly equal.

This remarkably increased proportion of Decandrous Papilionaceous plants, forms another peculiarity in the vegetation of New Holland, where their maximum exists in the principal parallel. They are not so generally spread over the whole of *Terra Australis*, as the leafless *Acaciæ*, for although they extend to the southern extremity of Van Diemen's Island, they are even there less abundant, and very few species have been observed within the tropic. Papilionaceous plants with distinct stamina do not in fact form a very natural subdivision of the whole order, though those of New Holland, with perhaps one or two exceptions, may be considered as such: this Australian portion, however, forms nearly three-fourths of the whole section, at present known: the remaining part, consisting of genera, most of which are very different, both from each other and from those of *Terra Australis*, are found at the Cape of Good Hope, in æquinoctial and north Africa, in the different regions of America, in New Zealand, in India, very sparingly in

North Asia, and lastly in the South of Europe, where, however, only two species have been observed, namely, *Anagyris foetida*, and *Cercis Siliquastrum*; but the latter having a straight Embryo and a habit approaching to that of *Bauhinia*, rather belongs to *Lomentaceæ*.

Among the *Diadelphous* genera of *Terra Australis* the most remarkable in habit and structure, namely *Platylobium*, *Bossiaea*, *Hovea*, *Scottia*, and *Kennedia*, are found chiefly in the principal parallel and higher latitudes; within the tropic the greater part of these cease to exist, and most of the genera which there occur are common to other countries, especially India.

ATHEROSPERMEÆ.* Jussieu in his excellent memoir on *Monimieæ†* has referred *Pavonia* of Ruiz and Pavon and *Atherosperma* of Labillardiere to that order, from the other genera of which, namely, *Ambora*, *Monimia*, and *Ruiza*, they appear to me very different, not only in the insertion of the seed, in the texture of the albumen, and relative size of the Embryo, but in having antheræ similar to those of *Laurinæ*. I separate them therefore into a distinct family with the name of **ATHEROSPERMEÆ**. The propriety of this separation is confirmed by the discovery of two New Holland plants, evidently belonging to this family, but which have hermaphrodite flowers; a structure not likely to occur in *Monimieæ*, in which what has been termed calyx is more properly an involucre.

The place of *Atherospermeæ* in the natural series is not very easily determined. It is singular that differing so widely as they certainly do in most parts of their structure from *Laurinæ* they should notwithstanding agree with them, in the œconomy of their Antheræ, and very remarkably with some of them in their sensible qualities. Of the three Australian plants of this order.

* **ATHEROSPERMEÆ.** *Flores* dielines vel hermaphroditi. *Calyx* monophyllus, limbo diviso: lacinis sæpe duplici serie, interioribus omnibusve semipetaloideis: *Squamulæ* faucis in femineis et hermaphroditis. *Corolla* nulla. *Stamina* in masculis floribus numerosa, fundo calycis inserta, squamulis aucta; in hermaphroditis pauciora, fauce imposita: *Antheræ* adnatæ, biloculares, loculis valvula longitudinali a basi ad apicem dehiscenti. *Ovaria* uno plura, sæpius indefinita, monosperma, ovulo erecto: *Styli* simplices, nunc laterales v. basilares: *Stigmata* indivisa. *Pericarpia* clausa seminiformia, stylis persistentibus plumosis aristata, tubo aucto calycis inclusa. *Embryo* erectus brevis, in basi albuminis carnosi mollis.

Arbores. Folia opposita simplicia exstipulata. Pedunculi axillares, uniflori.

† *Annales du museum*, 14, p. 116.

two are found in the colony of Port Jackson, the third through the whole of Van Diemen's Island. Pavonia of the Flora Peruviana (Laurelia of Jussieu), a native of a similar climate, and possessing the same sensible qualities, is more nearly related to Atherosperma than is generally supposed, differing from it merely in the oblong form and regular bursting of its female calyx.

RHAMNEÆ. Into this order I admit such genera only as have ovarium cohering more or less with the tube of the calyx, of which the laciniae have a valvular æstivation; stamina equal in number to these laciniae, and alternating with them; an ovarium with two or three cells and a single erect ovulum in each; an erect Embryo generally placed in the axis of a fleshy albumen, or entirely without albumen: the petals, which are opposite to the stamina, and inclose the antheræ in their concave laminæ, are in some cases wanting.

With these characters Rhamnus, Ziziphus, Paliurus, Ceanothus (from which Pomaderris is hardly distinct), Colletia, Cryptandra, Phyllica, Gouania, Ventilago, and probably Hovenia correspond. In comparing this description of Rhamneæ with that of Buttneriaceæ formerly given, they will be found to coincide in so many important points, that the near relationship of these two orders cannot be doubted, and thus an unexpected affinity seems to be proved between Rhamneæ and Malvaceæ.

In Terra Australis upwards of 30 species of Rhamneæ, belonging to Ziziphus, Ceanothus, Pomaderris, Colletia and Cryptandra, have been observed, and chiefly in its principal parallel or southern regions.

CELASTRINÆ.* This order comprehends the greater part of the two first sections of the Rhamni of Jussieu; it is obviously different from the more limited order of Rhamneæ, which I have already attempted to de-

* **CELASTRINÆ.** *Calyx* 4-5 partitus, æstivatione imbricata. *Petala* 4-5. *Stamina* totidem, cum petalis alternantia, insertione ambigüe perigyna. *Ovarium* liberum, 2-4 loculare locus 1-polyspermis, ovulis erectis (rarò pendulis): *Stylus* 1-4. *Pericarpium* capsulare, vel clausum (Baccatum, Drupaceum vel alatum.) *Semina* in capsularibus arillata. *Embryo* fere longitudine albuminis carnosus, axilis.

Frutices vel Arbores. Folia *simplicia* (rarò *composita*) *alterna* vel *opposita*, *stipulata* *stipulis sæpius minutis*, quandoque nullis.

fine, and in many respects so nearly approaches to the *Hippocrateeæ* of Jussieu,* that it may be doubted whether they ought not to be united.

In New Holland the Celastrinæ are not numerous, nor do they form any part of its characteristic vegetation: their distribution is somewhat different from that of Rhamnææ, for they are found either in the principal parallel, or within the tropic.

STACKHOUSEÆ.† *Stackhousia* of Dr. Smith,‡ and an unpublished genus, exactly agreeing with it in flower, but remarkably different in fruit, form a small tribe of plants, sufficiently distinct from all the natural orders hitherto established. I have placed it between Celastrinæ and Euphorbiaceæ; to both of which, but especially to the former, it seems to be related in a certain degree.

The Stackhouseæ are peculiar to Terra Australis, and though found chiefly in its principal parallel, extend more sparingly both to the southern extremity of Van Diemen's Island, and to the north coast of New Holland.

EUPHORBIACEÆ.§ This is an extensive and very general family, of which about 100 species have already been observed in Terra Australis. Of these the greater part exist within the tropic, but the order extends to the southern extremity of Van Diemen's Island, and the greater number of the genera peculiar to this country are found in the principal parallel or higher latitudes.

* *Annales du mus.* 18. p. 486.

† STACKHOUSEÆ. *Calyx* 1-ph. 5-fidus, æqualis: tubo ventricoso. *Petala* 5, æqualia, summo tubo calycis inserta: unguibus cohærentibus in tubum calyce longiorem; laminis angustis stellato-patulis. *Stamina* 5, distincta inæqualia (duo alterna breviora), fauci calycis inserta. *Ovarium* liberum, 3-5-lobum, lobis discretis, monospermis, ovulise rectis: *Styli* 3-5, nunc basi cohærentes: *Stigmata* indivisa. *Pericarpium* 3-5-coccum, coccis evalvibus, apteris v. alatis; columna centrali persistenti. *Embryo* erectus axilis, longitudine fere albuminis carnosus.

Herbæ. Folia simplicia, integerrima, sparsa, quandoque minuta: Stipulæ laterales minutissimæ. Spica terminalis; floribus tribracteatis.

‡ *Linn. soc. transact.* 4. p. 218.

§ *Jus. gen.* 384.

The species of *Euphorbia* are not numerous in Terra Australis, most of them are intratropical plants, and all of them are referable to one section of the genus. It appears to me that the name of the order ought not to be taken from this genus, which is so little calculated to afford a correct idea of its structure that authors are still at variance in the names and functions they assign to several parts of the flower. The view I take of the structure of *Euphorbia* is, in one important particular at least, different from those given by Lamarek,* Ventenat,† Richard‡, and Decandolle, § though possibly the same that Jussieu has hinted at; || so briefly, however, and I may add obscurely, that if his supposition be really analogous to what I shall presently offer, he has not been so understood by those who profess to follow him in this respect.

With all the authors above quoted, I regard what Linneus has called Calyx and Corolla in *Euphorbia* as an Involucrum, containing several male flowers which surround a single female. By some of these authors the male flowers are described as monandrous, and in this respect, also, I agree with them; but the body which all of them describe as a jointed filament, I consider to be made up of two very distinct parts, the portion below the joint being the footstalk of the flower, and that above it the proper filament: but as the articulation itself is entirely naked, it follows that, there is no perianthium; the filiform or lacinated scales, which authors have considered as such, being on this supposition analogous to bractæ; The female flower, in conformity with this supposition, has also its pedunculus, on the dilated, and in a few cases obscurely lobed, apex of which the sessile ovarium is placed. If this be a correct view of the structure of *Euphorbia*, it may be expected that the true filament, or upper joint of what has commonly been called filament, should, as in other plants, be produced subsequent to the distinct formation of the anthera, which consequently will be found at first sessile on the lower joint or peduncule, after that has attained nearly its full length; and accordingly this proves to be the case in such species as I have examined. Additional probability is given to this view by the difference

* *Encyclop. botan.* 4. p. 413.

† *In Michaux, fl. bor. amer.* 2. p. 209.

‡ *Gen. pl.* 386.

† *Tableau*, 3. p. 487.

§ *Flor. Franc.* 3. p. 329.

existing between the surfaces of the two joints in some species. I consider it, however, as absolutely proved by an unpublished genus of this order, having an involucre nearly similar to that of *Euphorbia*, and like it, inclosing several fasciculi of monandrous male flowers, surrounding a single female; but which, both at the joint of the supposed filament, and at that by which the ovary is connected with its pedicellus, has an obvious perianthium, regularly divided into lobes.

UMBELLIFERÆ.* This order may be considered as chiefly European, having its maximum in the temperate climates of the northern hemisphere; in the corresponding southern parallels it is certainly much less frequent, and within the tropics very few species have been observed. In Terra Australis the Umbelliferæ, including a few Araliæ, which belong at least to the same natural class, exceed 50 species. The greater part of these are found in the principal parallel, in which also those genera deviating most remarkably from the usual structure of the order occur. The most singular of these is *Actinotus* of Labillardiere,† which differs from the whole order in having a single ovulum in the unimpregnated ovary. A second genus, which I shall hereafter publish with the name of *Leucolena*, is worthy of notice on account of the great apparent differences of inflorescence existing among its species; which agree in habit, in the more essential parts of fructification, and even in their remarkable involucella. Of this genus, one species has a compound umbel of four many flowered radii; a second has an umbel of three rays with two or three flowers in each; several others, still retaining the compound umbel, which is proved by the presence of their involucella, have from four to two single-flowered rays: and lastly one species has been observed, which is reduced to a single flower; this flower, however, is in fact the remaining solitary ray of a compound umbel, as is indicated by the two bractæ on its footstalk, of which the lower represents the corresponding leaf of the general involucre, while the upper is evidently similar to the involucellum of the two-rayed species of the genus.

* *Jus. gen.* 218.

† *Nov. holl. pl. spec.* 1. p. 67. t. 92. *Eriocalia Smith exot. bot.* 2. p. 37.

COMPOSITÆ.* Of this family, which is the most extensive among Dicotyledones, upwards of 2500 species have been already described. About 300 are at present known in Terra Australis, in which therefore the proportion of Compositæ to its Dicotyledonous plants is considerably smaller than that of the whole order to Dicotyledones generally, and scarcely half that which exists in the Flora of South Africa. It is also inferior in number of species to Leguminosæ, like which it seems expedient to consider it as a class including several natural orders. Of these orders *Cichoraceæ* and *Cinarocephalæ* are comparatively very rare in Terra Australis, not more than ten species of both having hitherto been observed.

The class therefore chiefly consists of *Corymbiferae*, which are very generally diffused, they are however evidently less numerous within the tropic, and their maximum appears to exist in Van Diemen's Island. *Corymbiferae* may be subdivided into sections and the greater part of the genera peculiar to Terra Australis belong to that section which may be named *Gnaphaloideæ*, and exist either in the principal parallel or higher latitudes.

The whole of *Compositæ* agree in two remarkable points of structure in their corolla; which, taken together at least, materially assist in determining the limits of the class. The first of these is its valvular æstivation, this, however, it has in common with several other families. The second I believe to be peculiar to the class, and hitherto unnoticed. It consists in the disposition of its fasciculi of vessels, or nerves; these, which at their origin are generally equal in number to the divisions of the corolla, instead of being placed opposite to these divisions and passing through their axes, as in other plants, alternate with them; each of the vessels at the top of the tube dividing into two equal branches running parallel to and near the margins of the corresponding lacinia, within whose apices they unite. These, as they exist in the whole class, and are in great part of it the only vessels observable, may be called primary. In several genera, however, other vessels occur, alternating with the primary and occupying the axes of the lacinia: in some cases these secondary vessels, being most distinctly visible in the lacinia, and becoming gradually fainter as they descend the tube, may be regarded as recurrent; originating from the united apices of

* *Adans. fam. 2. p. 103. Decand. theor. elem. 216.*

the primary branches ; but in other cases where they are equally distinct at the base of the tube, this supposition cannot be admitted. A monopetalous corolla not splitting at the base is necessarily connected with this structure, which seems also peculiarly well adapted to the dense inflorescence of Compositæ; the vessels of the corolla and stamina being united, and so disposed as to be least liable to suffer by pressure.

As this disposition of vessels is found in *Ambrosia* and *Xanthium* they ought not to be separated from Compositæ as Richard* has proposed ; and as it does not exist in *Brunonia* I prefer annexing that genus to *Goodenoviæ*, with which it agrees in the peculiar indusium of the Stigma.

GOODENOVIÆ.† This order I have formerly separated from Campanulaceæ, considering the peculiar membranous cup surrounding the stigma, along with a certain irregularity in the corolla, as sufficient distinguishing characters, especially as these are accompanied by other differences which appear to me important. In *Goodenoviæ* I have not included *Lobelia*, which, however, has also an irregular corolla, and although it wants the peculiar indusium of the stigma, has in its place a fasciculus or pencil of hairs surrounding that organ. This structure has been regarded by Jussieu and Richard, in a very leared memoir, more recently written on the subject,‡ analogous to the indusium of *Goodenoviæ*, to which they have therefore added *Lobelia* and derived the name of the order from this, its most extensive and best known genus. To the opinion of these authors I hesitate to accede, chiefly for the following reasons :

1st. In *Goodenoviæ* the deeper fissure of the tube of the corolla exists on its inner or upper side, a circumstance readily determined in those species having simple spikes. In *Lobelia*, on the other hand, the corresponding fissure is on the outer or lower side, a fact, however, which can only be ascertained before the opening of the corolla, the flowers in the greater number of species becoming resupinate in the expanded state, a circumstance that does not appear to have been before remarked. The relation therefore not only of the corolla but of the calyx and stamina to the axis of inflorescence, is different in these two tribes.

* *Annales du mus.* 8, p. 184.

† *Prodr. fl. nov. holl.* 573.

‡ *Annales du mus.* 18. p. 1.

2dly. In *Goodenoviæ* the greater part of the tube of the corolla is formed by the cohesion of five laciniae, the distinct inflected margins of which are in most cases visible nearly to its base; these laciniae are in some cases unconnected, as in *Diaspasis*, and more remarkably still in *Cyphia*, which is actually pentapetalous. I have observed no such structure in *Lobelia*.

3dly. At the period of bursting of the *Antheræ* the stigma in *Lobelia* is almost completely evolved, and capable of receiving impregnation from the pollen of the same flower; the function therefore of its surrounding pencil, is similar to that of the hairs which are almost equally obvious in many *Compositæ*, especially *Cinarocephalæ*. On the contrary in *Goodenoviæ* the stigma at the same period, is hardly visible, and is certainly not then capable of receiving impregnation from the pollen of its proper flower; it is therefore either impregnated by the *antheræ* of different flowers, or in some cases at a more advanced stage by the pollen of its own *antheræ*, which is received and detained in the *Indusium*. To these arguments for the exclusion of *Lobelia* I may add that in the greater part of *Goodenoviæ* with deliscent fruit, the dissepiment is parallel to the valves of the capsule, in which respect they differ equally from *Lobelia* and the valvular-fruited *Campanulaceæ*; and lastly, that many species of *Lobelia* as well as *Campanulaceæ* contain a milky juice of which there is no instance in *Goodenoviæ*. If therefore in *Lobelia* the pencil surrounding the stigma and the irregularity of the corolla, which, however, in some species is hardly perceptible, be considered as characters sufficient to separate this extensive genus from *Campanulaceæ*, it may form a separate order admitting, perhaps, of subdivision into several distinct genera.

I have formerly observed* that in two genera of *Goodenoviæ*, namely, *Euthales* and *Velleia*, the base of the corolla coheres with the ovarium while the calyx remains entirely distinct. This structure I had stated as being peculiar to these genera, and as in some degree invalidating one of Jussieu's arguments for considering the floral envelope of *Monocotyledones* as calyx rather than corolla. The fact, however, seems not to be admitted by Richard, who in the dissertation already quoted† describes what has hitherto been called calyx in *Velleia* as bracteæ: a view of the structure which in those species of that genus having triphyllous calyx, may appear

* *Prodr. fl. nov. holl.* 580.

† *Annales du mus.* 18. p. 17.

plausible, but of which the probability is diminished even in those with pentaphyllous calyx, and still more in Euthales, where the calyx is also tubular. But a stronger argument for the part usually denominated calyx being in these genera really such, may be derived from certain species of *Goodenia*, in which it will be admitted that both calyx and corolla are present, and where though both these envelopes adhere to the ovarium, they may be separately traced to its base; the coloured corolla being plainly visible in the interstices of the foliaceous calyx.

Goodenoviæ, whose maximum exists in the principal parallel of New Holland, are nearly but not absolutely confined to *Terra Australis*; the only known exceptions to this consist of the genus *Cyphia*, which is peculiar to Africa, and chiefly occurs at the Cape of Good Hope; of some species of *Scævola* which are found within the tropics; and of *Goodenovia littoralis*, which is common to the shores of *Terra Australis* and New Zealand, and according to Cavanilles is also a native of the opposite coast of South America.

STYLIDÆ.* This order, consisting of *Stylidium*, *Levenhookia*, and *Forstera*, I have formerly separated from *Campanulacæ*, on account of its reduced number of stamina, and the remarkable and intimate cohesion of their filaments with the style, through the whole length of both organs. It differs also both from *Campanulacæ* and *Goodenoviæ* in the imbricate æstivation of the corolla, and where its segments are unequal in the nature of the irregularity. In the relation which the parts of its flower have to the axis of inflorescence, and in the parallel septum of its capsule, it agrees with *Goodenoviæ* and differs from *Lobelia*, which, however, in some other respects it more nearly resembles.

Very different descriptions of the sexual organs in this tribe, and especially of the female, have been given by several French botanists. According to Richard the lateral appendices of the labellum in *Stylidium* are the real stigmata, the style being consequently considered as cohering with the tube of the corolla, and the column as consisting of stamina only. This view of the structure demands particular notice, not only from the respect to which its author is himself intitled, but because it has also been adopted by Jussieu,† whose arguments in support of it, and against the

* *Prodr. fl. nov. holl.* 565.

† *Annales du mus.* 18. p. 7.

common opinion, may be reduced to three. 1st. Were the common opinion admitted, the difficulty of conceiving so wide a difference in what he terms insertion of Stamina, in two orders so nearly related as Campanulaceæ and Stylideæ obviously are: 2dly. The alleged non-existence of the Stigma, which preceding authors had described as terminating the column: and lastly the manifest existence of another part, which, both from its appearance and supposed origin is considered as capable of performing the function of that organ.

In opposition to these arguments it may be observed, that the real origin of the Stamina is in both orders the same, the apparent difference arising simply from their accretion to the female organ in Stylideæ, a tendency to which may be said to exist in *Lobelia*. The inability to detect the Stigma terminating the column in *Stylidium* must have arisen from the imperfection of the specimens examined, for in the recent state, in which this organ is even more obvious than in *Goodenoviæ* at the time of bursting of the antheræ, it could not have escaped so accurate an observer as Richard; and were it even less manifest in *Stylidium*, its existence would be sufficiently confirmed from the strict analogy of that genus with *Levenhookia*, whose stigma, also terminating the column, consists of two long capillary laciniae, which are in no stage concealed by the antheræ.

With respect to the part considered as Stigma by Richard, I have formerly observed that it is obsolete in some species of *Stylidium* and entirely wanting in others,* and there is certainly no trace of any thing analogous to it in *Forstera*.

The greater part of the Australian *Stylideæ* exist at the western extremity of the principal parallel, several species are found at the eastern extremity of the same parallel, and a few others occur both within the tropic and in Van Diemen's Island. Beyond *Terra Australis* very few plants of this order have been observed; two species of *Stylidium*, very similar to certain intratropical species of New Holland, were found in Ceylon and Malacca by Kœnig; and of the only two known species of *Forstera*, one is a native of New Zealand, the other of *Terra del Fuego*, and the opposite coast of Patagonia.

* *Bauer illustr. tab. 5.*

RUBIACEÆ.* As this order is now constituted it appears to me impracticable to distinguish it from Apocineæ, by characters taken from the fructification alone ; and even if the Stellatæ or Asperuleæ be excluded, and the remarkable stipulation of its remaining sections be taken into account, it will not then, perhaps, admit of a definition entirely free from exceptions. It must also, I think, be allowed that Rubiaceæ, Apocineæ, Asclepiadeæ, and certain genera at present referred to Gentianeæ, form but one great natural class. In this class the leaves are uniformly simple, perfectly entire, and, with a very few exceptions, occurring in Asclepiadeæ and Apocineæ, also opposite ; while in the parts of fructification there are hardly any characters that are not liable to exceptions, unless the monopetalous regular corolla, and stamina alternating with its laciniae and not exceeding them in number.

The order *Rubiaceæ*, admitting it as it is at present established, is chiefly æquinoctial. In Terra Australis its maximum is also within the tropic, where, however, it is not very numerous ; and the most remarkable Australian part of the order, consisting of *Opercularia* and *Pomax*, is chiefly found in the principal parallel. Jussieu is very unwilling to admit these two genera into Rubiaceæ, and is rather disposed to consider them as a distinct family ; chiefly on account of their single-seeded ovary. To prove that this character alone, however, is not of such importance as to separate plants into different natural orders, it is sufficient to advert to Proteaceæ, Amaranthaceæ, and Epacrideæ, all of which contain genera with one, two, and even an indefinite number of seeds : and as Operculariæ entirely agree with many genera of Rubiaceæ in other points of structure of fructification, in habit, and especially in their remarkable stipulation, I think there can be no doubt that they ought to be referred to the same order, of which they may form a section, characterized not only by its single-seeded ovary, but by the peculiar dehiscence of its compound fruit.

APOCINEÆ,† I have already observed‡ that this order is very nearly

* *Juss. gen.* 196.

† *Prodr. fl. nov. holl.* 465. Apocinearum pars, *Juss. gen.* 143.

‡ *Werner. soc. transact.* 1. p. 12.

related to Rubiaceæ and Gentianeæ; the former appearing to differ chiefly in its remarkable stipulæ, the latter in its minute Embryo. If these characters be admitted, certain New Holland genera which I have placed with Gentianeæ will either be transferred to Rubiaceæ, or, as I have formerly proposed,* may with some others, constitute a family intermediate to Rubiaceæ and Apocineæ.

This order or section, which may be named LOGANEÆ, will consist of Logania, Geniostoma, (from which Anasser of Jussieu is not distinct), Usteria, Gærtnera of Lamarck†, Pagamea of Aublet, and, perhaps, Fagræa. Of these, the only New Holland genus is *Logania*, the greater part of whose species are found in the principal parallel. In this genus, which admits, however, of subdivision, the importance of stipulation seems to be entirely lost, for it contains species agreeing in this respect with Rubiaceæ, others in which the stipulæ are lateral and distinct, and one species, at least, in which they are entirely wanting.

There is an evident affinity between certain species of Logania and *Mitrasacme*, which I had therefore placed in Gentianeæ. *Mitrasacme* is very general in Terra Australis, but its maximum is within the tropic: it is not absolutely confined to New Holland, for I have observed in the Sherardian Herbarium two species collected at Cheusan, by Mr. Cunningham.

Among the true Apocineæ of New Holland, which are chiefly found within the tropic, the most remarkable genus is *Alyxia*, in which the albumen and embryo agree with those of the very different family Annonaceæ.

ASCLEPIADEÆ.‡ These plants differ from Apocineæ, solely in the peculiar structure of their genitalia, a character, however, which appears to me, fully sufficient to justify their separation. They are not very numerous in New Holland, where they are found chiefly within the tropic, and I have not observed any plant of the order in that country in a higher latitude than 34° S.

EPACRIDEÆ.|| The abundance of this family in Terra Australis

* *Prodr. fl. nov. holl.* 455.

† *Illustr. gen. tab.* 167.

‡ *Werner. soc. transact.* 1. p, 12. *prodr. fl. nov. holl.* 458.

|| *Prodr. fl. nov. holl.* 535. *Ericearum genera. Juss. gen.* 160.

constitutes one of the peculiarities of its vegetation. About 140 species have already been observed, the greater part of which are found in the principal parallel; the order, however, continues numerous at the south end of Van Diemen's Island, where several genera appear that have not been met with in other parts; within the tropic very few species have been observed, and none with capsular fruit.

Epacrideæ, with the exception of two species found in the Sandwich Islands, are confined to the southern hemisphere, several species have been observed in New Zealand, a few in the Society Islands, and even in the Moluccas; the only species with capsular fruit found within the tropic is *Dracophyllum verticillatum*, observed by Labillardiere in New Caledonia; and the only plant of the family known to exist in America is an unpublished genus also with capsular fruit, found by Sir Joseph Banks in Terra del Fuego.

The sections into which I have divided this order differ from each other in two remarkable points of structure. The *Styphelææ*, as they may be called, having a valvular or very rarely a plaited æstivation of the corolla, and a definite number of seeds; while the *Epacrideæ*, strictly so called, have along with their indefinite number of seeds and capsular fruit, a corolla with imbricate æstivation. I have formerly* pointed out what seems to be the natural subdivision of this section, depending more on the differences of insertion in its leaves than on characters derived from the parts of fructification.

LABIATÆ and VERBENACEÆ appear to me to form one natural class, the two orders of which gradually pass into each other. Terra Australis contains several remarkable genera of both orders, and chiefly in its principal parallel. *Chloanthes*† is the most singular among Verbenaceæ, having, with the fruit of that order, entirely the habit of Labiatae.

Westringia and Prostanthera, with the genera nearly related to each of these, are the most worthy of notice among Labiatae, all of them are limited to Terra Australis, and they are found chiefly in its principal parallel, but Westringia and Prostanthera abound also in Van Diemen's Island, and extend, though more sparingly, in the opposite direction as far

* *Prodr. fl. nov. holl.* 536.

† *Bauer illustr. tab.* 4.

as the tropic. *Prostanthera* is remarkable in the appendages to its antheræ, in the texture of its fruit, and in the remains of Albumen existing in the ripe seeds of several of its species. *Westringia*, and its related genera *Microcorys* and *Hemigenia*, differ from the rest of the order in having verticillate leaves, and from the greater part in the structure of antheræ, particularly in the order in which these organs become abortive. *Westringia*, according to Dr. Smith, has resupinate corolla, a term which in this case cannot allude to a mere inversion in the form of its lips, for this does not exist; and if it mean an absolute change in the relation of its parts to those of the calyx or to the included organs, it cannot, I apprehend, be admitted either in this genus or in any other of the order. The fact which I formerly stated* against the resupination of corolla in Labiatae is the uniformity of its æstivation in this order, in which the upper lip always covers the lower. To those who do not consider this as a sufficient proof, the following, drawn from another equally uniform point of structure, may perhaps appear more satisfactory. In Labiatae, as well as in several other orders with irregular flowers, the deviation from the usual quinary division of calyx and corolla in Dicotyledones, does not consist in an absolute suppression of parts, but merely in their confluence; a fact indicated by the disposition of vessels; thus, the upper lip of the corolla, which in this order generally consists of one piece, either entire, or more or less deeply bifid, is always furnished with two longitudinal nerves equidistant from its axis, which is without vessels; while each of the three laciniae usually forming the lower lip, has a single nerve passing through its axis; the upper lip is therefore to be considered even when entire, as made up of two confluent laciniae: and if this test be allowed to be conclusive, and applied to the corolla of those genera of Labiatae in which it is supposed to be resupinate, the opinion will be found to be erroneous.

MYOPORINÆ † The principal characters in the fructification of this order, by which it is distinguished from Verbenaceae, are the presence of Albumen in the ripe seed, and the direction of the Embryo, whose radicle always points towards the apex of the fruit. The first of these characters, however, is not absolute, and neither of them can be ascertained

* *Prodr. fl. nov. holl.* 499.

† *Prodr. fl. nov. holl.* 514.

before the ripening of the seed : for previous to the complete developement of the Embryo the fluid albumen or liquor amnios equally exists in both orders ; and although all the genera of Verbenaceæ have an Embryo whose radicle points towards the base of the fruit, yet many of them have pendulous seeds, and consequently a radicle remote from the umbilicus. Hence *Avicennia*,* which I formerly annexed to Myoporinæ, should be restored to Verbenaceæ, with which also it much better agrees in habit.

Myoporinæ, with the exception of *Bontia*, a genus of æquinoctial America ; and of two species of *Myoporum* found in the Sandwich Islands, has hitherto been observed only in the southern hemisphere, and yet neither in South Africa, nor in South America beyond the tropic. Its maximum is evidently in the principal parallel of Terra Australis, in every part of which it exists ; in the more southern parts of New Holland, and even in Van Diemen's Island it is more frequent than within the tropic. The genus *Myoporum* is also found in New Zealand, Norfolk Island, New Caledonia, and the Society Islands.

PROTEACEÆ.* I have formerly† offered several observations both on the geographical distribution and on some of the more remarkable points of structure of this order of plants. I shall now therefore confine myself to a few of the most important facts on each of these subjects.

Proteaceæ are chiefly natives of the Southern hemisphere, in which they are most abundant in a parallel included between 32° and 35° lat. but they extend as far as 55° S. lat. The few species found in the Northern hemisphere occur within the tropic.

Upwards of 400 species of the order are at present known, more than half of these are natives of Terra Australis, where they form one of the most striking peculiarities of the vegetation. Nearly four-fifths of the Australian Proteaceæ belong to the principal parallel, in which, however, they are very unequally distributed : the number of species at its western extremity being to those of the eastern as about 2 to 1, and what is much more remarkable, the number even at the eastern extremity being to that of the middle of the parallel as at least 4 to 1. From the principal parallel the diminution of the order in number of species is nearly equal in both

* *Prodr. fl. nov. holl.* 518.

† *Lin. soc. transact.* 10. p. 15.

directions: but while no genus has been met with within the tropic which does not also exist in the principal parallel, unless that section of *Grevillea* having a woody capsule* be considered as such, several genera occur at the South end of Van Diemen's Island which appear to be peculiar to it.

No Australian species of the order has been observed in any other part of the world, and even all its genera are confined to it, with the exception of *Lomatia*, of which several species have been found in South America; and of *Stenocarpus*, the original species of which is a native of New Caledonia.

The genera of Terra Australis that approach most nearly to the South African portion of the Proteaceæ exist in the principal parallel, and chiefly at its western extremity: those allied to the American part of the order are found either at the eastern extremity of the same parallel, or in Van Diemen's Island.

There is no species of Proteaceæ common to the east and west coasts of New Holland, and certain genera abound at one extremity of the principal parallel which at the opposite extremity are either comparatively rare or entirely wanting.

I have formerly remarked that in this order no instance of deviation from the quaternary division of the perianthium has been observed; a fact which is the more remarkable as this is itself a deviation from the prevailing quinary number in the floral envelopes of Dicotyledonous plants.

There is a peculiarity in the structure of the stamina of certain genera of Proteaceæ namely, *Simsia*, *Conospermum*, and *Synaphea*, in all of which these organs are connected in such a manner that the cohering lobes of two different antheræ form only one cell.

Another anomaly equally remarkable, exists in *Synaphea*, the divisions of whose barren filament so intimately cohere with the stigma as to be absolutely lost in its substance, while the style and undivided part of the filament remain perfectly distinct.

SANTALACEÆ. I have formerly† proposed, and attempted to

* *Cycleptera*, *Lin. soc. transact.* 10. p. 176. *prodr. fl. nov. holl.* 380.

† *Prodr. fl. nov. holl.* 350.

define this natural order, one of whose most remarkable characters consists in its unilocular ovarium, containing more than one, but always a determinate number of ovula, which are pendulous and attached to the apex of a central receptacle. This receptacle, which varies in its figure, in the different genera, in some being filiform, in others nearly filling the cavity of the ovarium, had not been previously noticed in any plant of the order.

The greater part of the Santalaceæ of Terra Australis are found in the principal parallel, to which several genera, namely, *Leptomeria*, *Corethrum*, and *Fusanus* are nearly limited : *Santalum* on the other hand is found chiefly within the tropic.

I have added *Exocarpus* and *Anthobolus* to this order, with certain genera of which they agree in habit and many points of structure, both of the flower and fruit : but they are readily distinguishable from the whole order by their fructus superus, and they may possibly differ also in the internal structure of their ovarium, which has not yet been satisfactorily ascertained.

The genus *Exocarpus* is most abundant in the principal parallel and southern parts of Terra Australis, but it is not unfrequent even within the tropic. *Exocarpus cupressiformis* is not only the most common species of the genus, but the most general tree in Terra Anstralis, being found in nearly the whole of the principal parallel, in every part of Van Diemen's Island that has been visited, and even within the tropic. I am acquainted with only three plants that have in that country an equally extensive range. These are *Anthistiria australis*, the most valuable grass as well as the most general plant in Terra Australis ; *Arundo Phragmitis*, less frequent than the former, but which extends from the southern extremity of Van Diemen's Island to the North coast of New Holland ; and *Mesembryanthemum æquilaterale*, which occurs on almost every part of the sandy sea shores, of both these Islands.

Exocarpus is not absolutely confined to Terra Australis, for Mr. Bauer has discovered a very remarkable species bearing its flowers on the margins of dilated foliaceous branches, analogous to those of *Xylophylla* ; and *Xylophylla longifolia*, which was taken up by Linneus from Rumphius,*

* *Xylophyllos ceramica*, *Herb. amb.* 7. p. 19. t. 12.

appears more probably, both from the description and figure of that author, to be also a species of *Exocarpus*.

There is so great a resemblance between the enlarged fleshy receptacle of *Exocarpus* and the berry of *Taxus*, that some botanists have been led to compare these plants together in other respects. A complete coincidence in this part of their structure would not indeed prove the affinity of these two genera, any more than it does that of *Exocarpus* to *Anacardium* or *Semecarpus*, with which also it has been compared; and to determine their agreement even in this respect it is necessary to understand the origin of the berry of *Taxus*, of which very different accounts have been given. According to Lamarck* it consists of the enlarged ovarium itself, perforated by the seed soon after impregnation; while Mirbel† considers it as formed of the scales of the female amentum, immediately surrounding the organ, named by him *cupula*; and considered as containing the pistillum, but which most other authors have regarded as the pistillum itself. My observations differ from both these accounts, for on examining the female fructification of *Taxus* before impregnation I find the rudiments of the future berry, consisting at that period of a narrow fleshy ring, surrounding the base only of the cupula of Mirbel, and very similar to the annular hypogynous nectarium of many flowers. If this cupula therefore were the pistillum itself, the berry of *Taxus* would have an origin analogous to that of *Balanites*,‡ as it has been very lately described by Mirbel; and on the other hand, if that author's view of the female fructification of *Taxus*, and *Coniferæ* generally, be adopted, it might then to a certain degree be compared with the external cupula of *Dacrydium*, which will be more particularly noticed hereafter; but from this it would still be very distinct both in its texture and in its not inclosing, in the early stage the cupula, on neither supposition, however, does its origin agree with that of the berry of *Exocarpus*, which in some respects more nearly resembles the fleshy receptacle of *Podocarpus*.

I have annexed *Olax* to *Santalaceæ*,§ not however considering it as absolutely belonging to the same family, but as agreeing with it in some

* *Encyclop. botan.* 3. p. 228.

† *Nouv. bulletin des scien.* 3. p. 73.

‡ *Delile in mem. sur l'Egypte*, 3. p. 326. *Ximenia ægyptiaca* Linn.

§ *Prodr. fl. nov. holl.* 357.

important circumstances; especially in the internal structure of its ovarium, and that of its pericarpium and seed; but as in *Olax* there appears to be a double floral envelope, as its antheriferous stamina alternate with the segments of the inner envelope, and its ovarium does not cohere with either, there are sufficient grounds for regarding it, with Mirbel, as a distinct family.

CASUARINEÆ. The genus *Casuarina* is certainly not referable to any natural order of plants at present established; and its structure being now tolerably understood, it may be considered a separate order, as Mirbel has already suggested.*

The maximum of *Casuarina* appears to exist in Terra Australis, where it forms one of the characteristic features of the vegetation. Thirteen Australian species have already been observed, the greater number of these are found in the principal parallel, in every part of which they are almost equally abundant; in Van Diemen's Island the genus is less frequent, and within the tropic it is comparatively rare; no species except *Casuarina equisetifolia* having been observed on the north coast of New Holland. Beyond Terra Australis only two species have been found, namely, *C. equisetifolia*, which occurs on most of the intratropical Islands of the Southern Pacific, as well as in the Moluccas, and exists also on the continent of India; and *C. nodiflora*, which is a native of New Caledonia.

In the male flowers of all the species of *Casuarina*, I find an envelope of four valves, as Labillardiere has already observed in one species, which he has therefore named *C. quadrivalvis*.† But as the two lateral valves of this envelope cover the others in the unexpanded state, and appear to belong to a distinct series, I am inclined to consider them as bractæ. On this supposition, which, however, I do not advance with much confidence, the Perianthium would consist merely of the anterior and posterior valves, and these firmly cohering at their apices, are carried up by the anthera, as soon as the filament begins to be produced, while the lateral valves or bractæ are persistent; it follows from it also that there is no visible perianthium in the female flower, and the remarkable œconomy of its lateral bractæ may, perhaps, be considered as not only affording an additional

* *Annales du mus.* 16. p. 451.

† *Plant. nov. holl.* 2. p. 67. t. 218.

argument in support of the view now taken of the nature of the parts, but also as in some degree again approximating *Casuarina* to *Coniferæ*, with which it was formerly associated.

The outer coat of the seed or caryopsis of *Casuarina* consists of a very fine membrane, of which the terminal wing is entirely composed; between this membrane and the crustaceous integument of the seed there exists a stratum of spiral vessels, which Labillardiere, not having distinctly seen, has described as an “integumentum arachnoideum;” and within the crustaceous integument there is a thin proper membrane closely applied to the Embryo, which the same author has entirely overlooked. The existence of spiral vessels, particularly in such quantity, and, as far as can be determined in the dried specimens, unaccompanied by other vessels, is a structure at least very unusual in the integuments of a seed or caryopsis, in which they are very seldom at all visible, and have never, I believe, been observed in such abundance as in this genus, in all whose species they are equally obvious.

CONIFERÆ.* The structure of the female parts of fructification in *Coniferæ* having, till very lately, been so little understood; and certain facts concerning it being still unpublished, I shall prefix a few observations on this subject to the remarks I have to offer on the Australian part of the order.

In the late essays of Mirbel and Schoubert on *Coniferæ* † that part of the female fructification which had previously been considered as the Pistillum, having a perforated style, is described as a peculiar organ inclosing the ovarium, and in most cases also the stigma. This organ, which they have named Cupula, they regard as more analogous to an involucre than to a perianthium, which, according to them, also exists, cohering, however, with the body of the ovarium. Without absolutely adopting this latter part of their statement, it appears to me that impregnation really takes place in the manner these authors describe. Their principal argument is derived from the genus *Ephedra*, in which both the stigma and a considerable part of the style project beyond this cupula, without cohering with its aperture. In further confirmation of their opinion it may be

* *Juss. gen.* 411.

† *Nouv. Bulletin des scien.* 3. p. 73, 85. et. 121.

observed that I have found a projection of the stigma, though certainly in a much less obvious degree, both in *Agathis** and in a species of *Podocarpus*.

Towards this discovery, as extending to the *Coniferæ* more strictly so called, an important step was made in *Pinus*, by the accurate Schkuhr,† who first correctly described and figured the cupula of that genus, but who considered it as the ovarium itself and the two processes of its aperture as stigmata. Mr. Salisbury, who seems to have been unacquainted with Schkuhr's observations, published, a few years afterwards,‡ the same opinion, which continued to be generally received till the appearance of the essays, already quoted, of Mirbel and Schoubert.

But these authors do not seem to be aware that certain plants of the order are even furnished with a double cupula. This is most remarkable in *Podocarpus*, in which the drupa is formed of this external cupula, whose aperture exists not at the apex, but very near its base or point of insertion. The inner cupula in this genus is in every stage entirely inclosed in the outer, and is in like manner inverted.

That this is the real structure of *Podocarpus* seems to be proved by that of the nearly related genus *Dacrydium*, hitherto so imperfectly understood. This genus has also a double cupula, the outer in the young state inclosing the inner, and both of them at this period being inverted as in *Podocarpus*; but the inner in a more advanced stage acquires nearly an erect position, by rupturing one side of the external cupula, which, not continuing to encrease proportionally in size, forms a cup surrounding the base only of the ripe fruit.

Three species of *Podocarpus* are found in Terra Australis, two of these exist in the colony of Port Jackson, the third was observed on the summit of the Table Mountain in Van Diemen's Island. *Podocarpus asplenifolia* of Labillardiere || is certainly not a *Podocarpus*, but either forms a distinct genus, as Richard has already supposed,§ or it may possibly be a species of *Dacrydium*; a conjecture which I have no means of verifying, having never seen the female fructification of this remarkable plant.

* *Salisbury in linn. soc. transact.* 8. p. 311. *Pinus Dammara Lamb, pin. p.* 61. *t.* 38.

† *Botan. handb.* 3. p. 276. *t.* 303.

‡ *Linn. soc. transact.* 8. p. 308.

|| *Plant. nov. holl.* 2. p. 71. *t.* 221.

§ *Annales. du mus.* 16. p. 299.

Callitris of Ventenat* is peculiar to Terra Australis, where it exists very generally, but most abundantly in the principal parallel: it consists of several species, differing from each other chiefly in the form of their fruit.

Araucaria excelsa, which was first observed in Norfolk Island and New Caledonia, is found also on the east coast of New Holland, immediately within the tropic: it is there, however, a tree of very moderate dimensions, and never of that enormous size which it not unfrequently attains in Norfolk Island.

ORCHIDEÆ.† The Australian species of this order already known amount to 120, many of these, however, are of very rare occurrence, and none of them appear to be produced in abundance.

The maximum of the order exists in the principal parallel, a considerable part extends to Van Diemen's Island, and very few have been observed within the tropic.

The greater part form genera nearly or entirely peculiar to Terra Australis, and most of these genera belong to that division of the order having farinaceous pollen, with an anthera which is inserted but not deciduous, and either parallel to the stigma or terminating the column. The two sections of this division with parallel and terminal anthera, are found in New Holland to pass very gradually into each other, and several genera belonging to the former are, in that country, remarkable for the great expansion of the lateral lobes of the column. These lateral lobes I have considered as barren stamina, which, like those of *Philydrum*, are occasionally, though indeed very rarely, furnished with rudiments of *Antheræ*. This structure as well as that of *Cypripedium*, in which the lateral lobes are antheriferous, while the middle is barren, approximates the flower of Orchideæ to what may be called the type of *Monocotyledones*, that is, a regular flower with ternary division of its envelope, stamina, and cells or placentæ of the fruit.

I have attempted a similar approximation of true *Scitamineæ*,‡ whose processes crowning the ovarium, and usually two in number, form the complement of the stamina.

* *Dec. gen. nov.* 10. † *Prodr. fl. nov. holl.* 309. ‡ *Prodr. fl. nov. holl.* 305.

Maranteæ, or *Canneæ*,* an order at present referred to Scitamineæ, may also be reduced to this type; they differ, however, from Scitamineæ in the mutual relation of their barren and fertile stamina, somewhat as *Cypripedium* does from the other genera of Orchideæ; except that in *Maranteæ* the imperfection is greater, a single lobe only of one of the lateral stamina having the appearance of an anthera and producing pollen.

It is remarkable that so very few Orchideæ of Terra Australis belong to that section of the order with angular elastic pollen and adnate anthera; this section being not only the most numerous in Europe, but existing in an equal proportion, though singularly modified, at the Cape of Good Hope.

Of another section of the order formerly comprehended under the Linnean genus *Epidendrum*, most of which, though not properly parasitical, grow upon trees, several species, chiefly belonging to *Dendrobium*, are found in New Holland. In the northern hemisphere very few plants of this section that grow on trees have been observed beyond the tropic. The only exceptions to this, that I am acquainted with, consist of two species of a genus related to *Dendrobium*, discovered by Dr. Buchannan, in Upper Nepaul; † of *Dendrobium moniliforme*, observed by Kæmpfer, and Thunberg, in Japan, near Nagasaki: and of *Epidendrum conopseum*, ‡ which, according to Mr. William Bartram, grows in East Florida, in lat. 28° N.

In some parts of the southern hemisphere this section appears to have a more extensive range. On the East coast of New Holland several species of *Dendrobium* and *Cymbidium* are found in 34° S. lat.; but this is probably about their southern limit in that country, no species having been met with on any part of its South coast. They have, however, been observed in a considerably higher latitude in New Zealand, in the northern island of which several species were collected by Sir Joseph Banks, in about 38° S. lat., and *Epidendrum autumnale* of Forster grows in the neighbourhood of Dusky Bay, in upwards of 45° S. lat.

I am not acquainted with the limit of this section in South America; but in South Africa, at the Cape of Good Hope none of those, at least, that are parasitical on trees, have been observed.

* *Loc. citat.* 307.

† *Epidendrum præcox* and *Epidendrum humile*. *Smith exot. bot. tabb.* 97 and 98.

‡ *Hort. Kew. ed. 2, vol. 5, p.* 219.

ASPHODELEÆ.† In this order I include the greater part, both of Asphodeleæ and Asparageæ of Jussieu, distinguishable from each other only by texture and dehiscence of fruit; differences which, as they separate *Stypandra* from *Dianella*, and *Eustrephus* from *Luzuriaga*, cannot be admitted to be of more than generic importance.

I confess myself unable to point out satisfactory distinguishing characters for this order, in my description of which, however, I have noted two circumstances, neither of them indeed peculiar to the order, but both of them appearing to extend through the whole of it; namely, the reduction of stamina from six to three, which occasionally occurs, constantly taking place by the suppression of those opposite to the outer series of the perianthium; and the existence of the black crustaceous testa or outer integument of the seed. It is probable I have given too much weight to this latter circumstance, in combining, partly on account of it, genera so very dissimilar as *Anthericum*, *Xanthorrhœa*, and *Astelia*.

Xanthorrhœa, which I have included in Asphodeleæ, is in habit one of the most remarkable genera of Terra Australis, and gives a peculiar character to the vegetation of that part of the country where it abounds. This genus is most frequent in the principal parallel, but it extends to the south end of Van Diemen's Island, and is also found within the tropic.

A plant of a very similar habit to *Xanthorrhœa*, agreeing with it in its caudex and leaves, having, however, a very different inflorescence, was observed abundantly at King George's Sound, but with fructification so decayed and imperfect that I have not been able to determine the structure either of its flower or fruit. This plant is introduced by Mr. Westall in the view of King George's Sound published in captain Flinders's account of his voyage.

I had annexed *Hypoxis* and *Curculigo* to the Asphodeleæ, chiefly on account of a similarity in the testa of the seed; but they differ so much from this order in other parts of their structure, and from Amaryllideæ both in this respect and in the singular umbilicus of the seed, as well as in habit, that it is better to consider them as forming a separate family.

Of this family, which may be called HYPOXIDEÆ,* only five species

* *Prodr. fl. nov. holl.* 274.

† HYPOXIDEÆ. *Perianthium* superum: limbo sexpartito, regulari, æstivatione imbr-

have been observed in Terra Australis, four of these belong to *Hypoxis*, which is chiefly an extratropical genus, the fifth is a *Curculigo* very like those of India.

PALMÆ. Only six species of this order have been observed in New Holland, and of two of these the fructification is at present unknown.

The New Holland Palms exist chiefly within the tropic, but one species is found in 34° S. lat. ; it seems, however, that this is nearly the southern limit of the order in that country, no species having been seen on any part of the South coast.

In New Zealand a species of *Areca* was observed by Sir Joseph Banks, in about 38° S. lat., which is probably nearly the limit of Palms, in the southern hemisphere. In the northern hemisphere their extent is not materially different from this : in North America, indeed, they do not appear to grow beyond 36° lat. ; but in Europe *Chamærops humilis* extends as far as the neighbourhood of Nice.

It is remarkable that no species of Palm has been found in South Africa, nor was any observed by Mr. Lechenault*, on the West coast of New Holland, even within the tropic.

JUNCEÆ. We are now in possession of so many links connecting together the Monocotyledonous orders with regular flowers, that in attempting to define several of them, we are obliged to have recourse to differences, many of which may appear, and some of which unquestionably are, of but secondary importance. Of this kind may be considered the characters by which I have endeavoured to distinguish *Junceæ* from *Asphodelæ*, namely the difference in the texture of the perianthium, and in that of the testa of the seed, in the consistence of the albumen, and in the order of suppression of the stamina ; these when reduced to three in number being always placed opposite to the three outer leaves of the perianthium : in

cata. *Stamina* sex, imis lacinis inserta. *Ovarium* 3-loc. loculis polyspermis. *Capsula* evalvis, nunc baccata, polysperma. *Semina* umbilico laterali rostelligiformi ; testa atra crustacea. *Embryo* in axi albuminis carnosus : *radicula* vaga.

* *Annales du mus.* 17. p. 87.

this respect and in the more important character of the position of the Embryo Junceæ differ also from Restiaceæ, to which they more nearly approach in habit.

Three very remarkable genera, which I have referred to Junceæ, are peculiar to Terra Australis. Of two of these *Calectasia* and *Dasypogon*, each consisting of only one species, figures and descriptions are annexed to this essay.

Of the third, *Xerotes*, 24 species have already been observed. This genus is somewhat more abundant in the principal parallel than in other parts; but it is very generally extended, and is more frequent within the tropic than in Van Diemen's Island. *Xerotes*, in the structure and appearance of its flowers and in the texture of Albumen, has a considerable resemblance to Palms, but it wants the peculiar characters of the seed and also the habit of that remarkable order.

Flagellaria, which I have added to Junceæ, differs from *Xerotes* chiefly in its pericarpium, and in the form and relation of its Embryo to the Albumen, which is also of a different texture; in all these respects it approaches to Cyperaceæ, with some of whose genera it has even a certain resemblance in habit. This genus has usually been found only within the tropics, but in New Holland it extends as far as 33° S. lat.

Philydrum, which I have annexed to Junceæ, has always appeared to me an insulated genus, yet though not referable to any established natural order, it may be compared with several in certain respects. In the structure of its stamina it may in one point of view be said to be intermediate between Scitamineæ and Orchideæ; in that of its pericarpium and even of its seeds it has some affinity to the latter order; yet it differs from both of them in almost every other respect. In general appearance, it bears a considerable resemblance to *Cartonema*, which belongs to Commelineæ. In some parts of its structure it may be compared with *Xyris*, and perhaps with *Burmannia*; a genus which I have likewise annexed to Junceæ, but whose real affinities are equally obscure.

Philydrum pygmæum differs in so many respects from *P. lanuginosum* that it may probably hereafter be considered a distinct genus; and a very few additions to this tribe of plants would sanction their formation into a separate natural order.

RESTIACEÆ. The principal character distinguishing this family from *Junceæ* and *Cyperaceæ* consists in its lenticular Embryo being placed at the extremity of the seed opposite to the umbilicus; from *Junceæ* it also differs in the order of suppression of its stamina, which when reduced to three are opposite to the inner laciniae of the perianthium; and most of its genera are distinguishable from both these orders as well as from *Commelineæ* by their simple or unilocular antheræ.

With the exception of *Eriocaulon*, *Tonina*, and *Xyris*, the order appears to be confined to the Southern hemisphere. In *Terra Australis* its maximum is in the principal parallel, but it extends to the southern extremity of Van Diemen's Island, where it is even in considerable abundance, and exists, though much more sparingly within the tropic.

Restiaceæ are almost equally numerous at the Cape of Good Hope, as in the principal parallel of New Holland. One species only of the order has been observed in New Zealand, and hitherto none in South America.

CYPERACEÆ. In *Terra Australis* this is a very extensive order, consisting already of more than 200 species. It contains, however, fewer peculiarities in structure than several other orders that are much less numerous. Its maximum appears to be in the principal parallel; but the species observed solely within the tropic exceed one-third of the whole number. *Cyperaceæ*, in many respects, are nearly related to *Restiaceæ*, and when furnished with a true perianthium are distinguishable from the monospermous genera of that order, solely by the different position of the Embryo in the seed. But in the greater part of the order the Perianthium is either entirely wanting or merely setaceous. *Fuirena*, *Lepidosperma* and *Orcobolus*, all of them natives of New Holland, are almost the only genera in which it is found of nearly the usual appearance.

What I have formerly termed Perianthium in *Carex*, *Diplacrum*, and *Schœnus nemorum*, ought, perhaps, rather to be considered as internal lateral bractæ, analogous to those of *Lepyrodia*, of *Irideæ*, and, perhaps, to the upper valve of the inner envelope of grasses.

I have formerly remarked that the Perianthium of *Hypœlyptum*

consists merely of the squamæ of a spicula, similar to that of *Kyllinga*, but reduced to two valves.

GRAMINEÆ. This order comprehends, at least, one-fourth of the whole of Monocotyledones, and in *Terra Australis*, where upwards of 200 species have already been observed, it bears the same proportion to that primary division.

I have formerly, in arranging the Australian genera of *Gramineæ*, endeavoured to explain what I conceived to be the natural subdivision of nearly the whole order into two great tribes. The reasons which I then assigned for this arrangement appear, however, either not to have been comprehended, or to have been considered too hypothetical. With a view of removing the supposed obscurity and strengthening my former arguments, I shall preface what I have now to say on the subject, by a few observations common to both tribes.

The natural or most common structure of *Gramineæ* is to have their sexual organs surrounded by two floral envelopes, each of which usually consists of two distinct valves: but both of these envelopes are in many genera of the order subject to various degrees of imperfection or even suppression of their parts.

The outer envelope or *Gluma* of Jussieu, in most cases, containing several flowers with distinct and often distant insertions on a common receptacle, can only be considered as analogous to the bractæ or involucre of other plants.

The tendency to suppression in this envelope appears to be greater in the exterior or lower valve, so that a gluma consisting of one valve may, in all cases, be considered as deprived of its outer or inferior valve. In certain genera with a simple spike, as *Lolium* and *Lepturus*, this is clearly proved by the structure of the terminal flower or spicula, which retains the natural number of parts; and in other genera not admitting of this direct proof, the fact is established by a series of species shewing its gradual obliteration, as in those species of *Panicum* which connect that genus with *Paspalum*.

On the other hand, in the inner envelope or *Calyx* of Jussieu, obli-

teration first takes place in the inner or upper valve ; but this valve having, instead of one central nerve, two nerves equidistant from its axis I consider it as composed of two confluent valves, analogous to what takes place in the calyx and corolla of many irregular flowers of other classes ; and this confluence may be regarded as the first step towards its obliteration, which is complete in many species of *Panicum*, in *Andropogon*, *Pappophorum*, *Alopecurus*, *Trichodium*, and several other genera.

With respect to the nature of this inner or proper envelope of grasses, it may be observed that the view of its structure now given, in reducing its parts to the usual ternary division of *Monocotyledones*, affords an additional argument for considering it as the real *Perianthium*. This argument, however, is not conclusive, for a similar confluence takes place between the two inner lateral bractæ of the greater part of *Irideæ* ; and with these, in the relative insertion of its valves, the proper envelope of grasses may be supposed much better to accord, than with a genuine *Perianthium*. If therefore this inner envelope of grasses be regarded as consisting merely of bractæ, the real *Perianthium* of the order must be looked for in those minute scales, which in the greater part of its genera are found immediately surrounding the sexual organs.

These scales are in most cases only two in number, and placed collaterally within the inferior valve of the proper envelope. In their real insertion, however, they alternate with the valves of this envelope, as is obviously the case in *Ehrharta* and certain other genera ; and their collateral approximation may be considered as a tendency to that confluence which uniformly exists in the parts composing the upper valve of the proper envelope, and which takes place also between these two squamæ themselves, in some genera, as *Glyceria* and *Melica*. In certain other genera, as *Bambusa* and *Stipa*, a third squamula exists, which is placed opposite to the axis of the upper valve of the proper envelope, or, to speak in conformity with the view already taken of the structure of this valve, opposite to the junction of its two component parts. With these squamæ the stamina in triandrous grasses alternate, and they are consequently opposite to the parts of the proper envelope ; that is, one stamen is opposed to the axis of its lower or outer valve, and the two others are placed opposite to the two nerves of the upper valve. Hence, if the inner envelope be considered as

consisting of bracteæ and the hypogynous squamæ as forming the perianthium, it seems to follow, from the relation these parts have to the axis of inflorescence, that the outer series of this perianthium is wanting, while its corresponding stamina exist, and that the whole or part of the inner series is produced while its corresponding stamina are generally wanting. This may, no doubt, actually be the case, but as it would be, at least, contrary to every analogy in Monocotyledonous plants, it becomes in a certain degree probable that the inner or proper envelope of grasses, the calyx of Jussieu, notwithstanding the obliquity in the insertion of its valves, forms in reality the outer series of the true perianthium, whose inner series consists of the minute scales, never more than three in number, and in which an irregularity in some degree analogous to that of the outer series generally exists.

It is necessary to be aware of the tendency to suppression existing, as it were, in opposite directions in the two floral envelopes of grasses to comprehend the real structure of many irregular genera of the order, and also to understand the limits of the two great tribes into which I have proposed to subdivide it.

One of these tribes, which may be called PANICEÆ, comprehends *Ischæmum*, *Holcus*, *Andropogon*, *Anthistiria*, *Saccharum*, *Cenchrus*, *Isachne*, *Panicum*, *Paspalum*, *Reimaria*, *Anthenantia*, *Monachne*, *Lappago*, and several other nearly related genera; and its essential character consists in its having always a Locusta of two flowers, of which, the lower or outer is uniformly imperfect, being either male or neuter, and then not unfrequently reduced to a single valve.

Ischæmum and *Isachne* are examples of this tribe in its most perfect form, from which form *Anthenantia*, *Paspalum*, and *Reimaria* most remarkably deviate in consequence of the suppression of certain parts: thus *Anthenantia* (which is not correctly described by Palisot de Beauvois,) differs from those species of *Panicum* that have the lower flower neuter and bivalvular, in being deprived of the outer valve of its gluma; *Paspalum* differs from *Anthenantia* in the want of the inner valve of its neuter flower; and from those species of *Panicum*, whose outer flower is univalvular, in the want of the outer valve of its gluma; and *Reimaria* differs from *Paspalum* in being entirely deprived of its gluma. That this is the real

structure of these genera may be proved by a series of species connecting them with each other, and *Panicum* with *Paspalum*.

Paniceæ have their maximum within the tropics, and they cease to exist in the most northern parts of Europe and the higher southern latitudes. Of this tribe, 99 species have been observed in Terra Australis, 79 of which were found within the tropic, and of these, 66 only within it. There is no Australian genus of this tribe; *Neurachne* and *Hemarthria* excepted, which is not chiefly intratropical.

The second tribe, which may be called *POACEÆ*, is more numerous than *Paniceæ*, and comprehends the greater part of the European genera, as well as certain less extensive genera peculiar to the æquinoctial countries; it extends also to the highest latitudes in which Phænogamous plants have been found, but its maximum appears to be in the temperate climates considerably beyond the tropics. The Locusta in this tribe may consist of one, of two, or of many flowers, and the two flowered genera are distinguished from *Paniceæ* by the outer or lower flower being always perfect; the tendency to imperfection in the locusta existing in opposite directions in the two tribes. In conformity with this tendency in *Poaceæ*, the outer valve of the perianthium in the single flowered genera is placed within that of the gluma, and in the many flowered locusta the upper flowers are frequently imperfect. There are, however, some exceptions to this order of suppression, especially in *Arundo Phragmitis*, *Campulosus*, and some other genera, in which the outer flower is also imperfect, but as all of these have more than two flowers in their locusta, they are still readily distinguished from *Paniceæ*.

In Terra Australis the *Poaceæ* amount to 115 species, of which 69 were observed beyond the tropic and of these 63 only beyond it; but of the 52 species that occur within the tropics 49 belong to genera which are either entirely or chiefly intratropical, and of the remaining three species, two, namely, *Arundo Phragmitis*, and *Agrostis virginica*, are very general and also aquatic plants. The distribution of this tribe, therefore, in Terra Australis agrees with that which obtains in other parts of the world.

FILICES.* Of this order nearly 1000 species are described in the

* *Prodr. fl. nov. holl.* 145.

fifth volume of Willdenow's edition of the *Species Plantarum*. In their geographical distribution Ferns differ from all the other orders of cryptogamous plants, their maximum being in the lower latitudes, probably near, or very little beyond the tropics. Thus Norfolk Island, situated in 29° S. lat. and only a few leagues in circumference, produces as many species of the order as are described in Dr. Smith's *Flora Britannica*.

But as shade and moisture are essential conditions to the vegetation of the greater part of Ferns, few species only have been observed in those parts of æquinoctial New Holland, hitherto examined. The number of species already found, however, in the different regions of *Terra Australis* exceeds 100, of which, nearly one-fourth are also natives of other countries.

Among the Australian Ferns there is no genus absolutely confined to that country, except *Platyzoma*, but this, perhaps, ought not to be separated from *Gleichenia*.

Only two arborescent Ferns have been observed in *Terra Australis*, one in the colony of Port Jackson, the second, *Dicksonia antarctica*, is frequent in Van Diemen's Island, at the southern extremity of which its trunk is not unfrequently from 12 to 16 feet in height. An arborescent species of the same genus was found by Forster, in New Zealand, at Dusky Bay, in nearly 46° S. the highest latitude in which tree ferns have yet been observed. It is remarkable that, although they have so considerable a range in the southern hemisphere, no tree fern has been found beyond the northern tropic : a distribution in the two hemispheres somewhat similar to this has been already noticed respecting the *Orchideæ* that are parasitical on trees.

I have formerly, in treating of the New Holland *Asplenium*, observed that *Cænopteris* does not differ from them in the relation its involucra have to the axis of the frond or pinna, but merely in having the ultimate pinna more deeply divided with one, or, at most, two involucra on each segment, towards the margins of which they must necessarily open : hence, the characters of both genera not unfrequently occur in the same frond, and are even exhibited by the same involucre when it happens to extend below the origin of the segment.

I have observed also, in the same place, that in *Asplenium* when the

involucrum originates from the inner branch of a primary vein, which is usually the case, it opens inwards or towards the mid-rib of the frond from which the vein is derived ; and that when it arises from the lower or outer branch of a vein it opens outwards, or in an opposite direction, instances of which occur in several species of the genus, in some of those especially where the frond is simple. On the same law also depends the peculiar character of *Scolopendrium*, in which the involucri are produced in pairs, one of each pair originating from the lower branch of a vein, the other from the upper branch of the vein immediately below it ; they consequently open in opposite directions and towards each other. This law, however, in *Asplenium* is only observed where the vein has but few branches, for when these are more numerous, and especially when, in consequence of their greater number, the vein has a manifest trunk or axis, the involucri of all its branches open towards this axis : the most remarkable instances of this occur in those species of the genus which authors have separated from it, under the name of *Diplazium*, where, however, another peculiarity exists, depending on the same law. This peculiarity consists in the inner branch of the vein, or that adjoining the mid-rib, appearing to have a relation not only to the axis of the vein but to that of the pinna or frond from which the vein originates ; a relation indicated by its having two involucri, one of which bursts towards the axis of the vein, the other towards the adjoining mid-rib. This double involucrum constitutes the character of *Diplazium*, but as it is confined to the inner branch, all the others being simple, and opening towards the axis of the vein, there do not appear to be sufficient grounds for its separation from *Asplenium*. I consider the curved involucrum of *Asplenium Filix Fœmina*, which exists only on this inner branch of the vein, as somewhat analogous to the double involucrum of *Diplazium* ; but in another point of view it may be regarded as an approach to the structure of *Nephrodium*, to which this plant has been improperly referred.

THERE are some other Australian natural families of plants to which, either as containing distinct and peculiar genera, or a considerable number of species, similar remarks might be extended ; but I have already exceeded the limits prescribed for the present essay, which I shall therefore conclude with a few general observations, chiefly deduced from the facts previously stated, and with a very slight comparison of the vegetation of Terra Australis with that of other countries.

I have formerly remarked that nearly half the Australian species of plants, at present known, have been collected in a parallel included between 33° and 35° S. latitude ; and it appears, from the preceding observations on the several natural orders, that a much greater proportion of the peculiarities of the Australian Flora exist in this, which I have therefore called the *principal parallel* ; and that many of them are even nearly confined to it. But these peculiarities exist chiefly at its western and eastern extremities, and are remarkably diminished in that intermediate part which is comprehended between 133° and 138° E. long.

From the principal parallel most of the characteristic tribes diminish in number of species as well as of individuals, not, however, equally in both directions, but in a much greater degree towards the equator. In Van Diemen's Island the same general aspect of vegetation is retained ; but of the natural orders forming the peculiar character of the principal parallel several are very much reduced, while none are augmented in numbers ; and the only tribes which enter in nearly the same proportion into the composition of its Flora are *Eucalyptus*, the *Leafless Acaciæ* and, perhaps, *Epacrideæ*. Within the tropic, at least on the East coast, the departure from the Australian character is much more remarkable, and an assimilation nearer to that of India than of any other country takes place. Several of the peculiar orders and extensive genera of the principal parallel are here exceedingly diminished, and none remain in nearly equal proportion except *Eucalyptus* and the *Leafless Acaciæ*.

These two genera are not only the most widely diffused, but, by far, the most extensive in Terra Australis, about 100 species of each having been already observed ; and if taken together and considered with respect

to the mass of vegetable matter they contain, calculated from the size as well as the number of individuals, are, perhaps, nearly equal to all the other plants of that country. They agree very generally also, though belonging to very different families, in a part of their œconomy which contributes somewhat to the peculiar character of the Australian forests, namely, in their leaves or the parts performing the functions of leaves being vertical, or presenting their margin, and not either surface, towards the stem ; both surfaces having consequently the same relation to light. This œconomy, which uniformly takes place in the *Acaciæ*, is in them the result of the vertical dilatation of the foliaceous footstalk ; while in *Eucalyptus*, where, though very general, it is by no means universal, it proceeds from the twisting of the footstalk of the leaf.

The plants of *Terra Australis* at present known, amounting to 4200, are referable, as has been already stated, to 120 natural orders ; but fully half the number of species belong to eleven orders.

Of these *Leguminosæ*, *Euphorbiacæ*, *Compositæ*, *Orchideæ*, *Cyperacæ*, *Gramineæ*, and *Filices* are most extensive and very general tribes, which are not more numerous in *Terra Australis* than in many other countries.

Thus *Leguminosæ* and *Compositæ*, which taken together comprehend one-fourth of the whole of *Dicotyledones*, and *Gramineæ*, which alone form an equal part of *Monocotyledones*, bear nearly the same proportion to these primary divisions in the Australian Flora.

The four remaining orders are *Myrtacæ*, *Proteacæ*, *Restiacæ*, and *Epacrideæ*. Of these *Myrtacæ*, though it is likewise very general, has evidently its maximum in *Terra Australis*, more species having been already observed in that country than in all other parts of the world ; *Proteacæ* and *Restiacæ*, which are nearly confined to the southern hemisphere, and appear to be most abundant in the principal parallel of New Holland, are also very numerous at the Cape of Good Hope : and *Epacrideæ*, at least, equally limited to the southern hemisphere, are, with very few exceptions, confined to *Terra Australis*.

Several other less extensive natural families have also their maximum in this country, especially *Goodenoviæ*, *Stylideæ*, *Myoporinæ*, *Pittosporæ*, *Dilleniaceæ*, *Diosmæ*, and *Haloragææ* ; but the only orders that appear to be absolutely confined to *Terra Australis* are *Tremandracæ* and *Stack-*

houseæ, both of them very small tribes, which many botanists may be disposed to consider rather as genera than separate families.

A great part of the genera of Terra Australis are peculiar to it, and also a considerable number of the species of such of its genera as are found in other countries.

Of the species at present composing its Flora scarcely more than 400, or one-tenth of the whole number, have been observed in other parts of the world. More than half of these are Phænogamous plants, of which the greater part are natives of India, and the islands of the southern Pacific; several, however, are European plants, and a few belong even to æquinoctial America. Of the Cryptogamous plants the far greater part are natives of Europe.

In comparing very generally the Flora of the principal parallel of Terra Australis with that of South Africa, we find several natural families characteristic of the Australian vegetation, as Proteaceæ, Diosmeæ, Restiaceæ Polygalææ, and also Buttneriaceæ, if *Hermannia* and *Mahernia* be considered as part of this order, existing, and in nearly equal abundance, at the Cape of Good Hope; others are replaced by analogous families, as Epacridæ by Ericææ; and some tribes which form a considerable part of the Australian peculiarities, as Dilleniaceæ, the leafless *Acaciæ* and *Eucalyptus*, are entirely wanting in South Africa.

On the other hand, several of the characteristic South African orders and extensive genera are nearly or entirely wanting in New Holland: thus Irideæ, *Mesembryanthemum*, *Pelargonium*, and *Oxalis*, so abundant at the Cape of Good Hope, occur very sparingly in New Holland, where the South African genera *Aloe*, *Stapelia*, *Cliffortia*, *Penæa*, and *Brunia*, do not at all exist. Very few species are common to both countries, and of these the only one which is at the same time peculiar to the Southern hemisphere is *Osmunda barbara*.

We have not sufficient materials for a satisfactory comparison of the Flora of the higher latitudes of South America with that of the Southern parts of Terra Australis. If, however, we may judge from those at present in our possession, it would seem that the general character of the South American vegetation differs much more from the Australian than this does from that of South Africa. Yet several instances occur of the

same or of very nearly related genera, peculiar to the southern hemisphere, which are common to Terra Australis and South America, and which do not exist at the Cape of Good Hope. Thus the Pavonia or *Laurelia* of Chili has its nearly related genus *Atherosperma* in Van Diemen's Island ; where also a genus that I shall name *Tasmania* occupies the place of the *Wintera* of South America, from which it differs chiefly in having a single ovarium ; a species of the *Araucaria* of Chili exists in New Holland as well as in Norfolk Island and New Caledonia ; several *Lomatix* are found in South America ; a species of *Astelia* grows in Terra del Fuego ; and *Goodenia littoralis* of the southern shores of Terra Australis is found not only in New Zealand but on the opposite coast of America.

Certain tribes of plants common to South Africa and Terra Australis, and almost equally abundant in both these countries, are either very sparingly produced or cease to exist in South America. Others which abound in South Africa and are comparatively rare in Terra Australis are in South America entirely wanting ; and I am acquainted with no tribe of plants common to South Africa and South America and at the same time wanting in Terra Australis, unless the *Compositæ* with bilabiate corolla.

The character of the New Zealand Flora, known to us chiefly from the materials collected by Sir Joseph Banks, is to a considerable degree peculiar ; it has still however a certain affinity to those of the two great countries between which it is situated, and approaching rather to that of Terra Australis, than of South America.

In comparing together the Floras of Terra Australis and Europe, I shall chiefly confine myself to an enumeration of the species common to both countries ; the subject at present hardly admitting of many remarks of a more general nature. It may, however, be observed, that none of the great natural orders of Europe are absolutely wanting in Terra Australis ; that some of them, as *Compositæ*, *Leguminosæ*, *Gramineæ* and *Cyperaceæ* are found even in nearly the same proportion ; while others, as *Cruciferae*, *Ranunculaceæ*, *Caryophyllæ*, *Rosaceæ*, and *Ericææ* are reduced to very few species : and that several of the less extensive European orders, namely *Saxifrageæ*, *Cistinæ*, *Berberides*, *Resedeaceæ*, *Fumariaceæ*, *Grossularinæ*, *Valerianæ*, *Dipsaceæ*, *Polemonideæ*, *Globulariæ*, *Elæagneæ*, and *Equisetaceæ* in Terra Australis do not at all exist.

The greater number of Australian genera, except the *Acotyledonous*, differ from those of Europe ; there are, however, a few European genera, as *Utricularia*, *Drosera*, and *Samolus*, that appear to have even their maximum in *Terra Australis*.

From the following list of species, common to *Terra Australis* and Europe, I have carefully excluded all such, as though now existing in the different Settlements, have evidently, or probably, been introduced, and I am satisfied that no naturalized plant will be found in it except, perhaps, *Cynodon Dactylon*.

I have also excluded certain plants, as *Elatine* *Hydropiper*, *Geum urbanum*, *Oxalis corniculata*, *Lycopus europæus*, and *Typha angustifolia*, which, though appearing to differ in some respects from those of Europe, are probably not specifically distinct. And if among the *Phænogamous* plants inserted there be any room for doubt respecting the identity of the Australian and European species, it may possibly be as to *Arenaria marina*, *Zapania nodiflora*, *Atriplex Halimus*, *Potamogeton gramineum*, *Cyperus rotundus*, and *Holcus gryllus*.

The first observation that occurs with regard to this list is, that the relative proportions of the three primary divisions of plants compared with those of the Australian Flora are inverted : for of 2900 *Dicotyledones* of the Flora only 15 are natives of Europe ; while of 860 *Monocotyledones* 30, and of 400 *Acotyledones* upwards of 120 appear in the list.

The *Phænogamous* plants of the list are, with very few exceptions, also natives of North America, and several of them are found even in other parts of the world.

There is nothing peculiar in the apparent structure or œconomy of the *Dicotyledonous* plants common to countries so remote to account for their more general diffusion : though several of them grow in wet or marshy ground, yet very few are properly aquatic plants ; and in the structure of their seeds the only circumstance in which they all agree is in the plumula of their embryo not being evolved.

Of the *Monocotyledones*, on the other hand, a considerable number are aquatic plants ; and the greater part of those that are not aquatic belong to the irregular tribes, supposed to have a simpler structure.

Among the *Acotyledonous* or *Cryptogamous* orders it is remarkable

that there should be but a single species of Fern in the list, though those of the Flora exceed 100, of which 28 species are found likewise in other countries. It is also worthy of notice that of the Submersed Algæ not more than one-sixth of the whole number found occur in the list: while of the Musci and Hepaticæ one-third, and of the Lichenosæ two-thirds of those observed are also natives of Europe.

The proportion of European plants in Terra Australis, though only one-tenth of the whole number observed, appears to be greater than that in the Flora of South Africa. And the vegetation of the Cape of Good Hope, not only in the number of species peculiar to it, but in its general character, as depending on the extensive genera or families of which it is composed, differs almost as widely from that of the northern parts of the same continent, and the south of Europe, as that of the corresponding latitude of Terra Australis does from the Flora of India and of Northern Asia.

Of the proportion of European species in the Flora of South America, which is probably still smaller than that of South Africa, we have very insufficient means of judging: we know, however, from the collections made by Sir Joseph Banks, that at the southern extremity of America, certain European plants, as *Phleum alpinum*, *Alopecurus alpinus*, and *Botrychium Lunaria* exist; and that there is even a considerable resemblance in the general character of the Flora of Terra del Fuego to that of the opposite extremity of America and of the North of Europe.

A LIST OF PLANTS,

NATIVES BOTH OF

TERRA AUSTRALIS AND OF EUROPE.

DICOTYLEDONES.

POLYPETALÆ.

- Potentilla anserina* Linn.
Aphanes arvensis Linn.
Lythrum Salicaria Linn.
Portulaca oleracea Linn.
Arenaria marina Smith brit. 480.
Nasturtium amphibium Hort. Kew. ed. 2. vol. 4.
 p. 110.
Hydrocotyle vulgaris Linn.

MONOPETALÆ. ♥

- Sonchus oleraceus* Linn.
Picris hieracioides Linn.
Zapania nodiflora Prodr. 514.
Verbena officinalis Linn.
Prunella vulgaris Linn.
Calystegia sepium Prodr. 483.
Samolus valerandi Linn.

APETALÆ.

- Atriplex Halimus* Linn.

MONOCOTYLEDONES.

HYDROCHARIDÆ.

- Valisneria spiralis* Linn.
Lemna minor Linn.
 ——— *trisulca* Linn.

ALISMACEÆ.

- Potamogeton natans* Linn.
 ——— *perfoliatum* Linn.

- Potamogeton crispum* Linn.
 ——— *gramineum* Linn.
Alisma Plantago Linn.

AROIDÆ.

- Caulinia oceanica* Prodr. 339.
Zostera marina Linn.

JUNCÆ.

- Luzula campestris* Decand. franc. 3. p. 161.
Juncus maritimus Smith brit. 375.
 ——— *effusus* Linn.

CYPERACEÆ.

- Carex Pseudo-cyperus* Linn.
 ——— *cæspitosa* Linn.
Cladium Mariscus Prodr. 236.
Scirpus maritimus Linn.
 ——— *triqueter* Linn.
 ——— *mucronatus* Linn.
 ——— *lacustris* Linn.
Isolepis setacea Prodr. 222.
 ——— *fluitans* Prodr. 221.
Cyperus rotundus Linn.

GRAMINEÆ.

- Glyceria fluitans* Prodr. 179.
Arundo Phragmitis Linn.
Cynodon Dactylon Prodr. 187.
Panicum crus-galli Linn.
Pennisetum glaucum Prodr. 195.
Imperata arundinacea Prodr. 204.
Holcus Gryllus Prodr. 199.

ACOTYLEDONES.

MARSILIACEÆ.

Marsilea quadrifolia Linn.

FILICES.

Hymenophyllum tunbridgense Smith brit. 1141.

MUSCI.

Hypnum recognitum Hedw. sp. musc. 261.

Leskia complanata Hedw. sp. musc. 231.

Hookeria lucens Smith in linn. soc. transact. 9. p. 275.

Neckera pennata Hedw. sp. musc. 200.

——— *heteromalla* Hedw. sp. musc. 202.

Bryum capillare Hedw. sp. musc. 182.

——— *argenteum* Hedw. sp. musc. 181.

Bartramia pomiformis Hedw. sp. musc. 164.

Funaria hygrometrica Hedw. sp. musc. 172.

Barbula unguiculata Hedw. sp. musc. 118.

Trichostomum canescens Hedw. sp. musc. 111.

——— *polyphyllum* Hedw. suppl. 153.

Cynodontium capillaceum Hedw. sp. musc. 57.

Fissidens exilis Hedw. sp. musc. 152.

Dicranum purpureum Hedw. sp. musc. 136.

——— *flexuosum* Hedw. sp. musc. 145?

——— *scoparium* Hedw. sp. musc. 126.

Encalypta vulgaris Hedw. sp. musc. 60.

Weisia controversa Hedw. sp. musc. 67.

Grimmia pulvinata. *Dicranum pulvinatum* Hedw. suppl. 1. p. 189.

——— *apocarpa* Hedw. sp. musc. 76.

Gymnostomum pyriforme Hedw. sp. musc. 38.

Anictangium ciliatum Hedw. sp. musc. 40.

Phascum muticum Hedw. sp. musc. 25.

Sphagnum capillifolium Hedw. sp. musc. 25.

HEPATICÆ.

Jungermannia tomentella Hooker junger. 36.

——— *tamarisci* Linn.

——— *complanata* Linn.

——— *bidentata* Linn.

——— *pinguis* Linn.

——— *byssacea* Hooker junger. 12.

——— *furcata* Linn.

Targionia hypophylla Linn.

Marchantia polymorpha Linn.

VOL. II.

Marchantia hemisphærica Linn.

Anthoceros punctatus Linn.

Riccia glauca Linn.

——— *natans* Linn.

——— *fluitans* Linn.

LICHENOSÆ.

Lecidea geographica Achar. lichenogr. 163.

——— *confluens* Achar. loc. cit. 174.

——— *parasema* loc. cit. 175.

——— *luteola* loc. cit. 195.

——— *lurida* loc. cit. 219.

Gyrophora polyphylla. *G. heteroidea* β loc. cit. 219.

——— *proboscidea* loc. cit. 220.

Callicium claviculare loc. cit. 235.

Verrucaria nitida loc. cit. 279.

Endocarpon hepaticum loc. cit. 298.

Thelotrema lepadinum loc. cit. 312.

Lecanora atra loc. cit. 344.

——— *fusco-atra* loc. cit. 359.

——— β *dendritica* loc. cit.

——— *parella* loc. cit. 370.

——— *subfusca* loc. cit. 393.

——— *ventosa* loc. cit. 399.

——— *sulphurea* loc. cit. 399.

——— *decipiens* loc. cit. 409.

——— *lepidosa* loc. cit. 417.

——— *microphylla* loc. cit. 420.

——— *gelida* loc. cit. 428.

——— *lentigera* loc. cit. 423.

——— *brunnea* β *nebulosa* loc. cit. 419.

Roccella fuciformis loc. cit. 440.

Evernia prunastri loc. cit. 442.

Sticta crocata loc. cit. 447.

——— *pulmonacea* loc. cit. 449?

——— *scrobiculata* loc. cit. 453.

Parmelia caperata loc. cit. 457.

——— *olivacea* loc. cit. 462.

——— *parietina* loc. cit. 463.

——— *plumbea* loc. cit. 466.

——— *stellaris* loc. cit. 476.

——— *conspersa* loc. cit. 486.

——— *physode* loc. cit. 492.

Peltidea canina loc. cit. 517.

Ctenomyce pyxidata loc. cit. 534.

——— *coccifera* loc. cit. 537.

Cenomyce deformis *loc. cit.* 538
 ——— *cornuta* *loc. cit.* 545.
 ——— *rangiferina* *loc. cit.* 564
 ——— *vermicularis* *loc. cit.* 566.
Stereocaulon paschalis *loc. cit.* 581.
Sphærophoron coralloides *loc. cit.* 585.
 ——— *compressum* *loc. cit.* 586.
Ramalina fraxinea *loc. cit.* 602.
 ——— *fastigiata*, *loc. cit.* 602.
Cornicularia spadicea *loc. cit.* 611.
 ——— *lanata* *loc. cit.* 615.
 ——— *pubescens* *loc. cit.* 616.
Usnea florida *loc. cit.* 620.
Collema nigrum *loc. cit.* 628.
 ——— *fasciculare* *loc. cit.* 639.
 ——— *tremelloides* *loc. cit.* 655.
Lepraria flava *loc. cit.* 663.
 ——— *incana* *loc. cit.* 665.
 ——— *botryoides* *Achar. meth.* 6.

FUNGI.

Rhizomorpha setiformis *Pers. syn. fung.* 705.
Turbercularia vulgaris *Pers. syn. fung.* 112.

Sphæria ophioglossoides *Pers. syn. fung.* 4.
Clavaria pistillaris *Linn.*
 ——— *coralloides* *Linn.*
Peziza scutellata *Linn.*
Boletus igniarius *Linn.*
Agaricus alneus *Linn.*
 ——— *muscarius* *Linn.*
 ——— *campestris* *Linn.*

ALGÆ.

Conferva ebenea *Dillwyn brit. conf.* 101.
 ——— *ericetorum* *Dillwyn brit. conf.* 1.
Ulva plumosa *Huds. ang.* 571.
 ——— *lactuca* *Linn.*
Fucus articulatus *Turner fuci* 2 p. 93. t. 106
 ——— *obtusius* *Turner fuci* 1. p. 44. t. 21.
 ——— *pinnatifidus* *Turner fuci* 1. p. 40. t. 20.
 ——— *corneus* *Eng. bot* 1970.
 ——— *plicatus* *Turner fuci* 3 p. 107. t. 180.
 ——— *palmaris* *Turner fuci* p. 117. t. 115.
 ——— *rubens* *Turner fuci* 1. p. 89. t. 42.
 ——— *sinuosus* *Turner fuci* 1. p. 74. t. 35.

DESCRIPTIONS OF PLANTS, FIGURED IN THE ATLAS.

FLINDERSIA.

Ord. Nat. *Cedreleæ*.

Syst. Linn. *Pentandria Monogynia*, inter *Cedrelam* et *Calodendrum*.

CHAR. GEN. *Stamina* decem, dorso urceoli hypogyni inserta: alterna sterilia. *Capsula* 5-partibilis: segmentis singulis divisis *dissepi-mento* longitudinali, demum libero, utrinque dispermo. *Semina* erecta, apice alata.

FLINDERSIA AUSTRALIS. *Tab. 1.*

A tree of moderate size, observed September 1802, both in flower and with ripe capsules, in the woods and thickets near the head of Broad Sound, on the East coast of New Holland, in about 23° S. lat. The examination of Broad Sound was completed at the same time by Captain Flinders, to commemorate whose merits I have selected this genus from the considerable number discovered in the Expedition, of which he was the able and active commander.

DESC. *Arbor*, trunco pro ratione altitudinis mediocris crasso, coma irregulari, ramis patulis, ramulis teretibus umbellatis cortice fusco cinereo rugoso, gemmis foliorum apicibusque ramulorum gummiferis. *Folia* alterna, ad apicem ramuli conferta, exstipulata, petiolata, composita, ternata vel cum impari opposito-pinnata 2-3-juga: *foliola* oblongo-elliptica (in ramulis sterilibus quandoque lanceolata), integerrima glaberrima plana pellucido-punctata, dum 2-3 uncias longa 12-15 lineas lata. *Petiolus* communis angulatus mediocris: partialium laterales brevissimi, terminalis foliorum inferiorum 3-4 lineas æquans. *Paniculæ* terminales confertæ, ramis ramulisque alternis patentibus, pube brevi instructis: *bracteis* parvis subulatis. *Flores* parvi albi, odore debili haud ingrato. *Calyx* brevis 5-fidus, extus pubescens, laciniis æqualibus semiovatis acutis, persistens. *Petala* 5 sessilia oblongo-ovata obtusa plana, extus tenuissime pubescentia, basi disci staminiferi inserta, æstivatione imbricata. *Stamina* decem, infra apicem extus disci hypo-

gyni inserta, petalis breviora. *Filamenta* 5 *antherifera* cum petalis alternantia, prope basin disci inserta : 5 *sterilia* petalis opposita, breviora, in disco paulo altius imposita: omnia glabra compresso-filiformia conniventia: *Antheræ* conniventes ovato-cordatæ acuminatæ glabræ flavicantes, juxta basin affixæ, loculis apposis longitudinaliter dehiscentibus: *Pollen* flavum globosum læve. *Discus hypogynus* ovarium laxè circumdans, brevis glaber cyathiformis decomplicatus suberenatus. *Ovarium* liberum sessile depressoglobosum viride, tuberculis confertissimis obtusis undique tectum, villisque rarioribus tenuibus pubescens, 5-loculare: *Stylus* simplex erectus glaber obtusè 5-gonus: *Stigma* peltatum altè 5-lobum. *Capsula* lignea oblonga obtusa fere 3-uncialis, basi calyce minimo persistenti subtensa, undique echinata processibus suberoso-ligneis confertis subconicis, 5-partibilis, segmentis cymbiformibus, tandem ab apice semibifidis et siccatione sæpe transversim fissis, basibus ante dehiscenciam adnexis axi centrali brevi demum libero et persistenti. *Placenta* centralis longitudinaliter alte 5-loba, efformans *Dissepimenta* quinque longitudine capsulæ, cum segmentis alternantia ideoque eorum cavitates bipartientia, ante dehiscenciam margine interiore connexa, demum soluta, dimidiato-oblonga plana spongioso-lignea, versus dorsum obtusum sensim crassiora, margine interiore in aciem attenuata, utrinque disperma, et insignita lineis duabus alternis a margine interiore arcuatim descendentes et paulo intra dorsum desinentibus. *Semina* erecta, funiculo brevi compresso paulo supra basin marginis exterioris inserta, plano-convexa, apice in alam membranaceam planam uninervem ipso nucleo subovato sesquilogiorem desinentia. *Integumentum* simplex coriaceum basi lateribusque spongioso-incrassatis. *Albumen* nullum. *Embryo* dicotyledoneus albus: *Cotyledones* transversæ crasso-foliaceæ aveniæ: *Radicula* prope medium marginis interioris seminis transversa, brevissima, sinu baseos cotyledonum inclusa, ab umbilico remota.

Obs. There can be very little doubt that *Arbor Radulifera* of the Herbarium amboinense (3. p. 201, t. 129.) belongs to *Flindersia*, not only from the external appearance of the capsule as exhibited in the figure, but from the description given by Rumpf of its dehiscence, as well as of the peculiar dissepiments and the structure of the seeds.

The affinities of this genus are not perhaps very evident. I have referred it to *Cedreleæ*, an order certain genera of which are annexed by Jussieu to *Meliaceæ*, but which I have separated from that family chiefly on account of the structure of the fruit, and of the winged seeds. *Flindersia*, however, does not agree with the other genera of *Cedreleæ* either in the insertion of its seeds or dehiscence of its capsule: and it appears to differ from them remarkably in its moveable dessepiments; but these may be considered as the segments of a common placenta, having a peculiar form,

indeed, but not being in other respects essentially different from that of *Cedreleæ*. *Flindersia* is distinct also from the whole of the order, in having its leaves dotted with pellucid glands, in which respect it seems to connect *Cedreleæ* with *Hesperideæ*; and, notwithstanding the absence of albumen, even with *Diosmeæ*.

EUPOMATIA.

Ord. Nat. *Annonaceæ*!

Syst. Linn. *Icosandria Polygynia*, v. *Monadelphica Polyandria*.

CHAR. GEN. *Operculum* superum integerrimum deciduum (integumentis floralibus præterea nullis). *Stamina* uumerosa: *exteriora* antherifera: *interiora* sterilia petaloidea imbricata. *Ovarium* multiloculare, loculis indefinitis (numero et ordine), polyspermis. *Stigmata*: areolæ tot quot loculi, in apice planiusculo ovarii. *Bacca* polysperma.

EUPOMATIA LAURINA. Tab. 2.

In woods and thickets in the colony of Port Jackson, especially in the mountainous districts, and on the banks of the principal rivers; flowering in December and January.

DESC. *Frutex* erectus ramosus glaberrimus 5-10 pedes altus, trunco gracili, ramulis teretibus subporrectis. *Folia* alterna, in ramulis bifaria, petiolata, exstipulata, impunctata coriacea utrinque nitida nigro-viridia, integerrima plana oblonga acumine brevi, basi acuta æquali, dum 5 uncias longa sesquiunciam lata. *Pedunculi* axillares, uniflori folio breviores ramuliformes, foliis 3-4 alternis nanis instructi. *Perianthium* superum, limbo juxta basin transversim dehiscente: *Operculo* caduco semielliptico, paulo ante dehiscentiam albo-virescenti, e calyce et corolla concretis forsan conflato. *Stamina* margine persistenti limbi perianthii inserta, multiplici serie, basibus connatis: *exteriora* antherifera numerosa patula vel arcuè reflexa; *Filamentis* e basi dilatata subulatis; *Antheris* ochroleucis linearibus, adnatis apice filamenti in mucronulum ultro producti, bilocularibus longitudinaliter dehiscensibus; *Polline* globoso lævi: *interiora* sterilia petaloidea, arcuè imbricata multiplici serie, basi invicem et antheriferis connexa simulque decidua, interioribus sensim minoribus arcuè imbricatis. *Ovarium* turbinatum multiloculare, loculis sparsis nec verticillatis, polyspermis, ovulis ellipticis angulo interiori loculi insertis. *Stigma* sessile planiusculum integrum, areolis subrotundis numero loculorum notatum. *Bacca* turbinato-obovata glabra, basi angusta limbi persistentis perianthii coronata, apice truncato areolato. *Semina* solitariè vel quandoque geminatim

inclusa cellulis clausis, mutuo pressione varie angulata, circumscriptione subovata glabra impresso-punctata, altera extremitate, sæpius obtusiore, affixa; chorda ventrali ab umbilico parvo ducta ad extremitatem oppositam ibique in chalazam integumento interiori adnatam desinente: *Integumentum* duplex; *exterius* membranaceum intus undique emittens processus breves inter rugas albuminis demissos, et secundum chordam ventralem processum continuum altiore nucleum semibipartientem; *interius* tenuissimum albumine arcissime adnatum: *Albumen* semini conforme carnosum lobatum. *Embryo* in regione umbilici, albumine 5-6ies brevior, dicotyledoneus albicans: *Cotyledones* lineares foliaceæ: *Radicula* teres recta longitudine cotyledonum.

Obs. This genus forms a very unexpected addition to *Annonaceæ*, of which it will constitute a distinct section, remarkable in the manifestly perigynous insertion of its stamina and the cohesion of the tube of its calyx with the ovarium. It has therefore nearly the same relation to the other genera of the order that *Nymphæa* has to *Hydropeltis*: and the affinity in both cases is chiefly determined by the structure of the seed.

The Operculum of *Eupomatia*, in which there is no mark of longitudinal division, may be considered as formed either of the calyx alone, or of the confluent calyx and corolla, as appears to be the case at least in several species of *Eucalyptus*.

A singular part of the structure of *Eupomatia* consists in its internal, barren, petal-like stamina, which, from their number and disposition, completely cut off all communication between the *Antheræ* and *Stigmata*. This communication appears to be restored by certain minute insects eating the petal-like filaments, while the antheriferous stamina, which are either expanded or reflected, and appear to be even slightly irritable, remain untouched. I have at least not unfrequently seen the barren stamina removed in this way, and, as all the stamina are firmly connected at the base and fall off together, it is difficult to conceive any other mode of exposing the *Stigmata* to the influence of the *Antheræ*.









EUDESMIA.

Ord. Nat. *Myrtaceæ*, inter *Eucalyptum* et *Angophoram*.

Syst. Linn. *Polyadelphia Polyandria*.

CHAR. GEN. *Calyx* superus, 4-dentatus. *Petala* arcte connata in *Operculum* 4-striatum deciduum. *Stamina* in phalanges quatuor polyandras, cumdentibus calycis alternantes, basi connata. *Capsula* 4-loc. polysperma, apice dehiscens.

EUDESMIA TETRAGONA. Tab. 3.

In exposed barren places near the shores, in the neighbourhood of Lucky Bay, on the South coast of New Holland in 34° S. lat. and 123° E. lon.; gathered both in flower and fruit in January 1802.

DESC. *Frutex* 3-5 pedes altus, ramis patentibus, ramulis 4-gonis angulis marginatis. *Folia* opposita quandoque subopposita, petiolata, sæpius aversa, lanceolata vel oblonga, coriacea compacta, integerrima marginata glauca resinoso-punctata, venis vix emersis anastomozantibus, 3-4 uncias longa, 14-16 lineas lata. *Umbellæ* laterales paucifloræ, pedunculo pedicellisque ancipitibus. *Calyx* turbinatus obtuse 4-gonus cum ovario cohærens, angulis apice productis in dentes breves subinæquales, duobus oppositis paulo majoribus. *Operculum* depresso-hemisphæricum muticum glandulosum albicans, striis quatuor cruciatis parum depressis dentibus calycis oppositis notatum, quasi e petalis quatuor conflatum, caducum. *Stamina* plurima: *Filamenta* in phalanges quatuor petalis oppositas approximata, capillaria glabra alba, interiora sensim breviora: *Antheræ* ovato-subrotundæ incumbentes ochroleucæ, loculis longitudinaliter dehiscentibus. *Ovarium* inclusum tubo adherenti calycis, 4-loculare: *Stylus* 1, cylindraceus: *Stigma* obtusum. *Capsula* inclusa et connata tubo aucto turbinato oblongo ligneo calycis, apice 4-fariam dehiscens.

OBS. There can be no doubt respecting the affinity of this genus, which belongs to *Myrtaceæ* and differs from *Eucalyptus* solely in having a striated operculum placed within a distinctly toothed calyx, and in its filaments being collected into bundles. The Operculum in *Eudesmia*, from the nature of its striæ and their relation to the teeth of the calyx, appears to be formed of the confluent petals only: whereas, that of *Eucalyptus*, which is neither striated nor placed within a distinct calyx, is more probably composed, in several cases at least, of both floral envelopes united. But in many species of *Eucalyptus* a double Operculum has been observed; in these the outer Operculum, which generally separates at a much earlier

stage, may, perhaps, be considered as formed of the calyx, and the inner consequently of corolla alone, as in *Eudesmia*: this view of the structure appears at least very probable in contemplating *Eucalyptus globulus*, in which the cicatrix caused by the separation of the outer operculum is particularly obvious, and in which also the inner operculum is of an evidently different form.

Jussieu, in some observations which he has lately made on this subject, (*in Annales du mus.* 19. p. 432.,) seems inclined to consider the operculum of *Eucalyptus* as formed of two confluent bractæ, as is certainly the case with respect to the calyptra of *Pileanthus*, and of a nearly related genus of the same natural family. This account of its origin in *Eucalyptus*, however, is hardly consistent with the usual umbellate inflorescence of that genus; the pedicelli of an umbel being always destitute of bractæ; and in *Eucalyptus globulus*, where the flowers are solitary, two distinct bractæ are present as well as a double operculum. But a calyptra analogous to that of *Pileanthus* exists also in most of the species of *Eucalyptus*, where it is formed of the confluent bractæ common to the whole umbel, and falls off at a very early period.

CEPHALOTUS.

Ord. Nat. *Rosaceæ*.

Syst. Linn. *Dodecandria Hexagynia*.

CHAR. GEN. *Calyx* coloratus, 6-fidus, æstivatione valvata. *Petala* o. *Stam.* 12, perigyna: *Antherarum* dorso glanduloso. *Ovaria* 6, distincta, monosperma, ovulo erecto. *Styli* terminales.

CEPHALOTUS FOLLICULARIS. *Tab.* 4.

Cephalotus follicularis. *Labillard. nov. holl.* 2. p. 7. t. 145.

In marshy ground, in the neighbourhood of King George's Sound, especially near the shores of Princess Royal Harbour, in 35° S. lat. and 118° E. long.; beginning to flower about the end of December.

DESC. *Herba* perennis. *Caulis* abbreviatus vix uncialis, demersus, sæpe sub terram divisus. *Folia* in apice vix emerso caulis conferta quasi radicalia, numerosa, petiolata, exstipulata, elliptica integerrima, enervia crassiuscula plana glabra pilisve raris instructa, viridia, 8-16 lineas longa. *Petiolus* folio vix brevior, semiteres basi parum dilatata.

Ascidia foliis intermistis, petiolisque similibus porrectis parumve deflexis insidentia, in orbem circa folia digesta, respectu petioli dependentia, quoad propriam cavitatem





erecta, subovata, operculata, uncialia: *Extus* ornata costis tribus ab ore cristato ortis, valde elevatis et sæpius apice longitudinaliter depresso latiusculo marginibus acutis pilosis; *lateralibus* obliquis dorsum versus tendentibus sensim declinantibus et prope medium lateris desinentibus in lineas cursum oblique anticum servantes pauloque supra basin ventris coalescentes; *ventrali* elevatiore recta, longitudine ascidii, apice semper latiusque depresso: *Intus* nitentia et e majore parte nigro-purpurea, paulo infra anulum costatum oris aucta margine prominulo integerrimo. *Ore* plusquam semiorbiculari, paulo infra marginem extus cineto annulo tenui, ortum præbente processibus numerosis (19-23), parallelis costæformibus, adnatis, extremitate interiore soluta brevi incurva acuta. *Operculo* e petiolo derivato et postico lateri oris ascidii lata basi inserto, foliaceo orbiculato-obovato emarginato planiusculo viridi, venis nigro-purpureis latis ramosis apice anastomozantibus picto, extus pilosiusculo intus glabro.

Scapus simplicissimus erectus pedalis sesquipedalis villosus pilis simplicibus acutis, instructus bracteis nonnullis alternis remotis deciduis; dimidio inferiore quandoque angulato, superiore semper tereti. *Spica* terminalis erecta biuncialis, composita spiculis numerosis, superioribus confertis, inferioribus sensim remotioribus, omnibus pedunculatis 4-5-floris, floribus subcorymbosis ebracteatis. *Bracteæ* pedunculos spicularum subtendentes subulato-lineares deciduæ. *Flores* parvi. *Calyx* albus, altè 6-fidus simplici serie, regularis æqualis, extus pube adpressa simplici, laciniis ovato-lanceolatis patulis apice denticulo interiore auctis: basi intus incrassata pilisque capitatis brevissimis hispidula. *Stamina* margini tubi calycis inserta, ejusdem laciniis breviora; sex laciniis alternantia longiora et præcociora: *Filamenta* subulata erecto-conniventia glabra purpurascentia: *Antheræ* conniventes subrotundæ didymæ, lobis appositis purpurascentibus longitudinaliter dehiscentibus, connectivo subgloboso fungoso celluloso albo adnatis: *Pollen* flavum. *Pistilla* 6 approximata, staminibus minoribus breviora: *Ovaria* cum laciniis perianthii alternantia subovata parum compressa glabra, margine ventrali truncato dorsali rotundato, monosperma; *Ovulo* erecto, magnitudine fere loculi et intra testam membranaceam continente sacculum magnitudine cavitatis testæ, pendulum: *Styli* terminales teretiusculi: *Stigmata* simplicia. *Fasciculus* laxis villorum centrum receptaculi intra ovaria occupat.

Obs. Cephalotus has been referred by its discoverer Labillardiere to Rosaceæ, to which, notwithstanding its coloured calyx and the absence of petals, it seems to have the nearest affinity; a knowledge of the fruit, however, is wanting to determine absolutely its place in the natural method. From the structure of its ovulum, even in the unimpregnated state, I entertain no doubt that the radicle of the Embryo points to the umbilicus of the seed and therefore downwards; a circumstance in which it would

differ from the greater part, but not from all the Rosaceæ; and in other respects it does not appear to belong to any subdivision of that order hitherto proposed.

In the structure of its Ascidia it agrees with *Nepenthes*, with which, however, it has no other point of resemblance.

The Ascidia or Pitchers of *Cephalotus* were observed to be in general nearly half filled with a watery fluid, in which great numbers of a small species of Ant were frequently found drowned. This fluid, which had a slightly sweet taste, may possibly be in part a secretion of the Pitcher itself, but more probably consists merely of rain-water received and preserved in it. The lid of the Pitcher in the full grown state was found either accurately closing its mouth or having an erect position and therefore leaving it entirely open; and it is not unlikely that the position of the lid is determined by the state of the atmosphere, or even by other external causes.

ANTIARIS.

Ord. Nat. *Urticeæ*, inter *Brosimum* et *Olmediam*.

Syst. Linn. *Monœcia Tetrandria*

CHAR. GEN. MASC. *Involucrum* multiflorum, basi orbiculata florifera, apice multifido. *Calyx* 4-ph. *Stam.* 4.

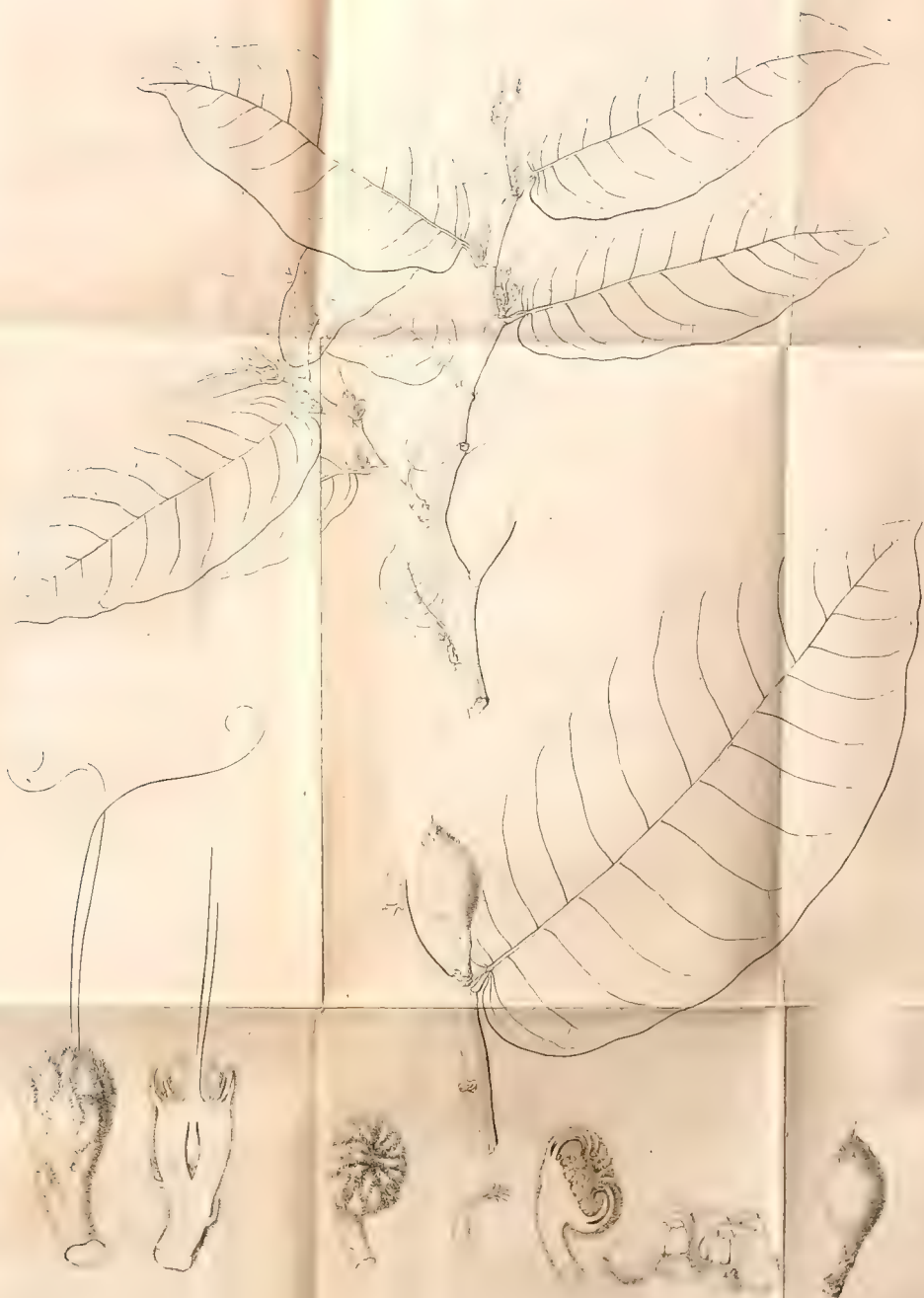
FEM. *Involucrum* uniflorum, urceolatum, apice multifidum. *Calyx* o. *Ovarium* cum involucro cohærens, monospermum, ovulo pendulo. *Stylus* bipartitus. *Drupa* ex involucro aucto formata. *Semen* exalbuminosum. *Embryonis* radícula supera.

ANTIARIS MACROPHYLLA. *Tab.* 5.

A shrub or very small tree observed in barren stony places, on the shores of the Company's Islands, adjacent to Arnhem's Land, on the North coast of New Holland, in about 12° S. lat.; bearing both flowers and ripe fruit in February 1803.

DESC. *Frutex* orgyalis ramosissimus glaber lactescens. *Ramuli* teretes. *Folia* alterna, petiolata, stipulata, oblonga cum brevi acumine, basi inæquali subcordata, glaberrima integerrima coriacea, supra nigro-viridia nitida subtus viridiora, venis fere rectangulis juxta marginem anastomozantibus, venulis divaricatis, dum sex uncias longa ultra





Passiflora

tres uncias lata. *Petoli* teretiusculi cinerascetes semunciales. *Stipula* intrafoliacea conduplicata lanceolata acuminata foliacea. *Pedunculi* axillares solitarii, brevi-simi, androgyni, pedicellis 6-8 alternis, infimo femineo præcociore, reliquis masculis. **MASC.** *Involucrum* subcyathiforme apice multifido, laciniis imbricatis acutis ciliatis conniventibus, demum expansum orbiculare marginibus reflexis, diametro quinquelineari. *Flosculi* numerosi densè conferti sessiles. *Calyx* 4-ph. foliolis subspathulatis apice conniventibus. *Corolla* o. *Antheræ* biloculares: *Pollen* album. Nullum rudimentum pistilli. **FEM.** *Involucrum* uniflorum ovatum parvum glabrum viride apice multifidum, laciniis numerosis lanceolatis ciliatis conniventibus, nunnulisque dorsalibus sparsis similibus. *Calyx* o. *Stamina* o. *Ovarium* accretum et inclusum ventre involucri, monospermum, ovulo pendulo: *Stylus* profundè bifidus, laciniis filiformibus elongatis albicantibus glabris: *Stigmata* acuta. *Drupa* ex involucri aucto efforata, ovalis abra, magnitudine pruni domestici minoris, nigro-sanguinea, substantia carnosæ crassæ lactescente intus flavicante, lacte albo; *putamine* ovato cruciata: tenaci levi fusco. *Integumentum seminis* præter putamen nullum. *Albumen* nullum. *Embryo* dicotyledoneus albus: *Cotyledones* maximæ amygdalino-carnosæ ovatæ plano-convexæ: *Radicula* superior brevissima.

Obs. When I collected and described this plant on the north coast of New Holland, I had no reason to suppose it had any affinity to the *Upas Antiar* or Poison tree of Java, of which the first satisfactory account has been since published by Mr. Leschenault. There can however be no doubt that the plant of New Holland belongs to the same genus with *Antiaris toxicaria* of that author,* notwithstanding some difference between our accounts of the structure of the male flowers; with respect to which I have only to observe that my description was taken from living plants, and I consider its correctness to be very much confirmed by the figure, which was afterwards made from dried specimens, by Mr. Bauer, who was unacquainted with my observations. *Antiaris* evidently belongs to *Urticæ*, and in a natural series will stand between *Brosimum* of Swartz and *Olmedia* of Flora Peruviana, agreeing with the latter in the structure of its male flowers, and more nearly resembling the former in its female flowers and fruit.

* *Annales du mus.* 16. p. 478, t. 22.

FRANKLANDIA.

Ord. Nat. *Proteaceæ*.Sys^t. Linn. *Tetrandria Monogynia*.

CHAR. GEN. *Perianthium* hypocrateriforme: *limbo* quadripartito deciduo, æstivatione induplicata: *tubo* persistenti. *Antheræ* inclusæ, *perianthio* accretæ. *Squamæ* 4, *perigynæ*, in *vaginam* 4-fidam connatæ. *Ovarium* monospermum. *Caryopsis* fusiformis *pedicellata*, apice dilatato papposo.

FRANKLANDIA FUCIFOLIA. Tab. 6.

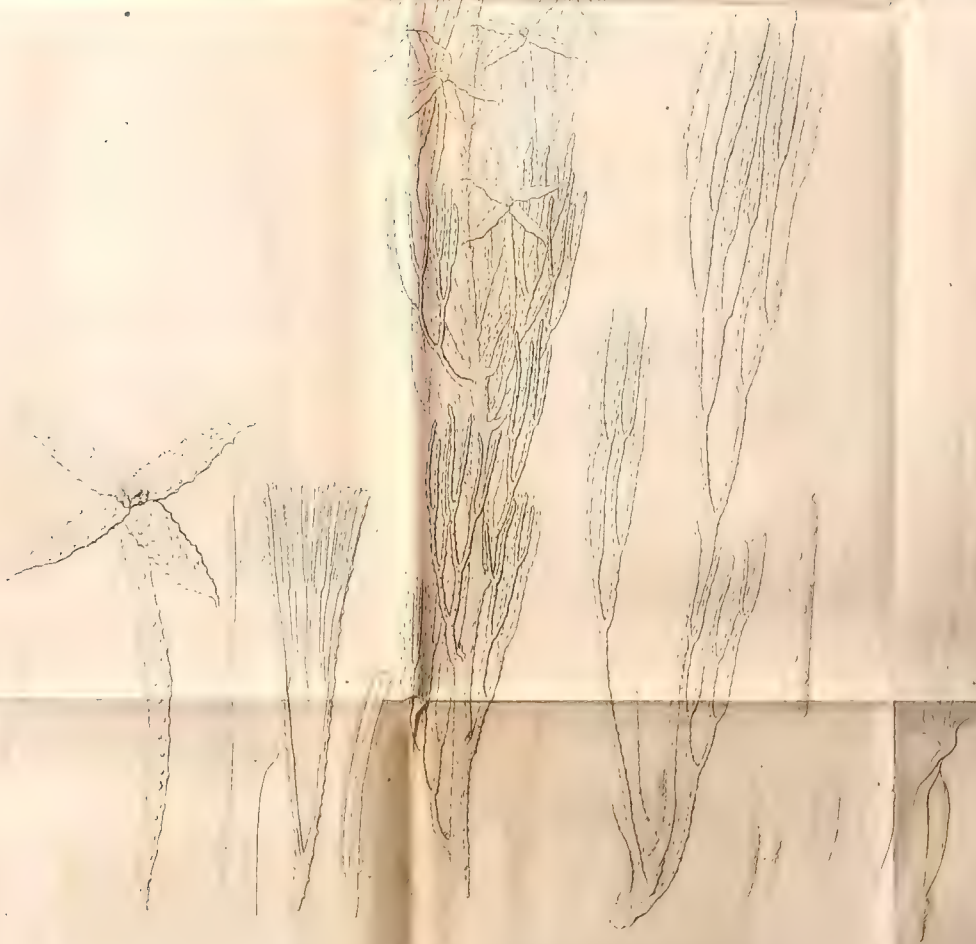
Franklandia fucifolia, *Linn. soc. transact.* 10, p. 157. *Prdr. fl. nov. holl.* 370.

In moist heaths near the shores of King George's Sound, on the South west coast of New Holland, found in flower and with ripe seed in December, 1801.

DESC. *Frutex* erectus ramosus 2-3 pedes altus glaber, glandulis pustuliformibus aurantiacis undique conspersus. *Rami* teretes striati, epidermide tenui cinerea. *Folia* alterna triuncialia filiformia, basi per spatium semunciale indivisa, dein dichotoma, laciniarum apicibus fastigiatis, ultimæ dichotomiæ ramulo altero bifido altero simplici. *Spicæ* axillares solitariæ simplicissimæ raræ pedunculatæ erectæ, foliis parum longiores: *pedicellis* alternis basi unibracteatis: *bractea* ovata obtusa concava sesquilineam longa, post lapsum peranthii fructiferi persistenti. *Perianthium* luteum fere biunciale, extus conspersum pustulis rufescentibus: *Ungues* in tubum cylindraceam cōhærentes, extra medium pappo caryopsidis expandenti solubiles et decidui; inferne arctius connati indurati persistentes: *Laminæ* tubo breviores, æquales lanceolatæ, disco plano, marginibus adscendentibus parum undulatis vividiusque coloratis, sub æstivatione induplicatis. *Stamina* 4, inclusa, antherarum apicibus faucem semiclaudentibus: *Filamenta* medio tubo perianthii quasi inserta, laciniiis opposita et iisdem longitudinaliter arcte cōhærentia: *Antheræ* lineares dimidio superiore filamenti in mucronulum ultro producti adnatæ, loculis appositis longitudinaliter debiscentibus: *Pollen* flavum subglobosum obsoletissimè trigonum læve. *Vaginula* dimidio inferiore tubi perianthii arctissime adnata, ita ut quasi ad eandem altitudinem ac filamenta inserta, supernè soluta quadridentata, demum increscenti caryopsidi quadrifida, laciniiis subulato-linearibus cum staminibus alternantibus. *Ovarium* teretiunculum, monospermum: dimidio inferiore barbato pilis strictis copiosis, tenuiore et in pedicellum sensim angustato: superiore fusiformi glabro striato: apice coronatum *Pappo* sessili capillari e pilis strictis acutis formato, ipsum ovarium aliquoties superante. *Stylus* filiformis erectus altitudine staminum lanatus apice glabro. *Stigma* turbinatum indivisum



L. P. 12 sc.



Phaseolus vulgaris

glabrum, apice depresso. *Caryopsis* crustacea, dimidio inferiore persistenti indurato tubi perianthii inclusa, striata apice dilatata in vaginulam brevem subcyathiformam extus pappigeram intus glabram. *Semen* fusiforme, membrana propria tenuissima apice chalaza fusca insignita. *Albumen* nullum. *Embryo* erectus subcylindraceus albus: *Cotyledones* brevissimæ semiorbiculatæ: *Radicula* maxima elongato-turbinata teres acuta: *Plumula* inconspicua.

Obs. Franklandia, though evidently belonging to Proteaceæ, differs from the whole of that family in at least three points of structure, any one of which may equally be assumed as the essential character of the genus; namely, in the antheræ being fixed through their whole length to the lacinia of the perianthium; in the squamæ which alternate with the stamina so intimately cohering at their base with the lower half of the calyx that they appear to originate from its upper part; and in the induplicate æstivation of the laminæ of the hypocrateriform perianthium. In this last respect the genus presents an exception to what I had formerly considered as one of the most constant distinguishing characters of the order; it does not however so materially invalidate this character as a change to any other kind of æstivation would have done; the induplicate and valvular modes passing into each other, merely by an abstraction or addition of the elevated margins of the lacinia. Instances of the abstraction of these elevated margins, in orders where they are generally present, are met with in Goodenoviæ and Convolvulaceæ, and an instance of their addition as in Franklandia occurs, though less obviously, in Chuquiraga, a genus belonging to Compositæ, in which family the valvular æstivation is as general as in Proteaceæ.

The æstivation of Franklandia may be adduced in support of that opinion which considers the floral envelope of Proteaceæ as corolla rather than calyx; there being, I believe, no instance of a similar æstivation in a genuine calyx, unless that of Nyctagines be regarded as such: but a stronger argument for this envelope being really calyx is afforded also by Franklandia, in which the transition from the footstalk to the perianthium is so gradual as to be externally imperceptible, and is not marked either by any change or interruption of the surface.

The apparently similar origin in Franklandia of the stamina and squamæ affords an argument, in addition to what I have formerly stated*, for con-

* *Linn. soc. transact.* 10. p. 159.

sidering the latter as barren filaments; we may therefore expect to find octandrous genera belonging to this family. While the persistence and induration of the lower half of the perianthium in this genus, and the perigynous origin of the squamæ, which in other genera of the order are hypogynous, render it not improbable that plants may hereafter be discovered having a calyx absolutely cohering with the ovarium, which nevertheless it may be necessary to refer to Proteaceæ.

Elæagneæ, in which the tendency to cohesion of the calyx and ovarium is still more obvious than in *Franklandia*, approach very near to Proteaceæ in most respects, and the single difference in fructification between these two orders, consisting in the stamina being opposite to the laciniae of the calyx in the latter and alternating with them in the former, is not an insuperable objection to their union; for *Drapetes*, which evidently belongs to Thymeleæ, has, in opposition to the rest of that order, its stamina alternating with the divisions of the perianthium.

SYNAPHEA.

Ord. Nat. *Proteaceæ*.

Syst. Linn. *Triandria Monogynia*.

CHAR. GEN. *Perianthium* tubulosum, 4-fidum, ringens. *Antheræ* tres, inclusæ: inferior didyma cum lateralibus dimidiatis primo cohærens in vaginam bilocularem, lobis proximis vicinarum loculum unicum constituentibus. *Stigma* filamentis superiore sterili connatum. *Nux*.

SYNAPHEA DILATATA. *Tab. 7.*

Synaphea foliis apice dilatatis trilobis: lobis inciso-dentatis, petiolis spicisque villosis, stigmatibus bicorni. *Linn. soc. transact.* 10, p. 156. *Prodr. fl. nov. holl.* 370.

Conospermum reticulatum. *Smith in Rees Cycloped.*

In exposed barren situations, near the shores of King George's Sound; gathered in flower and fruit, in December, 1801.

DESC. *Fruticulus* procumbens teres crassitie pennæ corvinæ, subramosus, villis patulis mollibus tomentoque appresso cinereus. *Folia* alterna, elongato-petiolata, adscendentia, cuneata, basi valde attenuata, apice dilatato trifido, lobis incis, segmentis

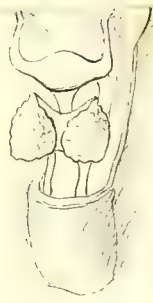
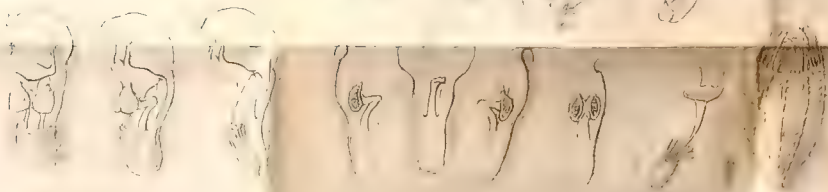


Fig. 1. Bacteroid.



Syntherisma debile.

at the base of the stem, at the base of the leaf, at the base of the fruit, at the base of the seed.

brevibus acutis mucronulo sphacelato; trinervia, nervis lateralibus margini approximatis simplici-sinis et infra apicem folii desinentibus, nec in lacinulas extimas productis; medio trifido, ramis lateralibus subalternis; utrinque pulchrè reticulata, areolis minutis subtus magis conspicuis; adulta glabrata, novella villosa. *Petiole* teretes, basi dilatata oblongo-lanceolata scariosa. *Spicæ* axillares solitariae simplicissimæ erectæ 3-4-unciales folia vix æquantes, basifloræ, rachi tomentosa, floribus alternis sessilibus unibracteatis; bracteis cucullatis ovatis acutis persistentibus. *Perianthium* coloratum flavum deciduum: *ungues* inferne connati in tubum demum 4-partibilem: *laminæ* in limbum bilabiatum dispositæ, lanceolatae; dorsali labium superius constituyente latiore; anticarum media lateralibus angustiore. *Stamina* tubo inclusa, supra medium unguium inserta: *Filamenta* quatuor, brevissima: *superiore* sterili apice cum stigmato connato; *religua* antherifera: *Antheræ* laterales dimidiatae; *inferior* didyma, lobis cum iis lateralium longitudinaliter connexis, ita ut lobus singulus inferioris cum respondentem laterali loculum unicum tandem bivalvem constituit, nullo vestigio dissepimenti: *Pollen* triangulare. *Squamæ hypogynæ* nullæ. *Ovarium* turbinatum pubescens apiceque ornatum pilis brevibus crassis pellucidis strictis, monospermum: *Stylus* curvatus glaber sursum incrassatus deciduus: *Stigma* dilatatum obliquum, hinc apice filamentum arcissime connatum, inde desinens in cornua duo parallela distantia subulata. *Nux* crustacea obovata striata pilosa, apiceque coronata pappo brevi e pilis strictis crassioribus formato.

Obs. In my general observations on Proteaceæ I have noticed two very remarkable characters of Synaphea, namely, the cohesion of the barren filament with the stigma, which is peculiar to this genus, and the structure and connection of the Antheræ, in which it agrees with Conospermum: it is also remarkable that these two nearly related genera should differ in the position of their barren and fertile stamina with relation to the perianthium; plants of the same natural family very generally agreeing in the order of abortion or suppression of these organs; to this however some other exceptions are known, and one has been already noticed as occurring in Drapetes.

The genus Synaphea seems to be confined to the south-west coast of New Holland, for it is more likely that *Polypodium spinulosum* of Burmannus (*flor. ind.* 233. t. 67. f. 1.) which I have formerly referred to this genus, as well as *Adiantum truncatum* of the same author, long since determined to be a species of Acacia, by Mr. Dryander, were brought from that coast to Batavia by one of the Dutch navigators, perhaps by Vlaming, than that they are really natives of Java, from which Burmannus received them.

DASYPOGON.

Ord. Nat. *Junceæ* inter Xerotem et Calectasiam.

Syst. Linn. *Hexandria Monogynia*, post Xerophytam.

CHAR. GEN. *Perianthium* duplex : *exterius* tubulosum, trifidum : *interius* triphyllum, foliolis semipetaloideis cochleariformibus. *Stamina* 6, imo perianthio inserta. *Ovarium* superum, uniloculare, trispermum, ovulis erectis. *Stylus* subulatus, *Stigma* simplex. *Utriculus* monospermus, tubo indurato aucto perianthii exterioris inclusus.

DASYPOGON BROMELIIFOLIUS. *Tab. 8.*

Dasyponon bromeliifolius. *Prodr. fl. nov. holl.* 263.

On the shores of King George's Sound ; observed in flower and fruit in December, 1801.

DESC. *Planta* suffruticosa sesquipedalis bipedalis, habitu peculiari, ad *Xerotem* aliquatenus accedenti. *Caulis* simplicissimus teres foliatus, pilis strictis brevibus copiosis denticulatis reversis tectus. *Folia* graminea ; radicalia conferta ; caulina sparsa superioribus remotis, breviora, semiamplexicaulia : omnia mucronata glabra marginibus denticulato-asperis. *Capitulum* terminale solitarium sphaericum, magnitudine nucis juglandis vel pruni minoris, bracteis nonnullis patulis foliiformibus involucreto. *Flores* sessiles conferti, paleis e dilatata basi lanceolatis margine denticulatis distincti, aliisque angustioribus intermistis. *Perianthium* *exterius* 3-partitum, extus pilis longis strictis denticulatis barbatum ; *unguibus* in tubum subovatum leviter cohaerentibus ; *laminis* distinctis ovatis concaviusculis infernè pallidis, supernè nigricantibus ibique intus pubescentissima : *Interius* longitudine exterioris, glabrum : *unguibus* angustis distinctis approximatis concaviusculis hyalinis glabris ; *laminis* ungue paulo latioribus, subellipticis ciliatis hyalinis, carina nigricanti apice pubescenti. *Stamina* ipsi basi perianthii inserta eoque fere duplo longiora : *Filamenta* aequalia filiformia alba glabra, apice incrassato subclavato cum apiculo brevi setaceo antherifero : *Antheræ* oblongæ pallidè flavæ incumbentes, infra medium affixæ, biloculares, loculis appositis approximatis longitudinaliter dehiscentibus. *Ovarium* subovatum trigonum glabrum albicans, ovulis oblongis : *Stylus* strictus glaber albus, inferne obsoletè trigonus, supernè teres. *Utriculus* membranaceus, inclusus tubo perianthii exterioris incrassato nucamentaceo nitido fusco glabrato. *Semen* subglobosum, integumento simplicissimo connato : *Albumine* carnoso semini conformi. *Embryo* - - -





C. hirsuta

CALECTASIA.

Ord. Nat. *Junceæ*.

Syst. Linn. *Hexandria Monogynia*.

CHAR. GEN. *Perianthium* inferum, tubulosum, hypocrateriforme, persistens: *limbo* petaloideo 6-partito, æstivatione imbricata. *Stamina* 6, fauci inserta: *Antheris* conniventibus, poro duplici apicis dehiscentibus. *Ovarium* uniloculare, trispermum, ovulis erectis. *Stylus* filiformis. *Stigma* simplex. *Utriculus* monospermus, tubo indurato perianthii inclusus.

CALECTASIA CYANEA. *Tab. 9.*

Calectasia cyanea Prodr. fl. nov. holl. 261.

On barren hills, near the shores of King George's Sound; flowering in December.

DESC. *Fruticulus* ramosissimus erectus cæspitem efformans, pedalis sesquipedalis, glaber; caule inferne tereti, basibus persistentibus foliorum squamoso. *Folia* e basibus dilatatis semivaginantibus imbricatis patula, acerosa ancipitia rigida semuncialia, mucrone brevi pungenti terminata, glabra; ramea patula, ramulorum modice patentia confertiora. *Flores* ramulos breves ultimos terminantes solitarii, sessiles, foliis floralibus minoribus confertissimis, intimis albicantibus, infernè cincti. *Perianthium*: *Tubo* angusto-infundibuliformi subcarnoso viridi striato, extus villosiusculo, intus glabro: *Limbo* stellatim patulo, laciniis lanceolatis brevissime mucronulatis immerse nervosis parum concavis vivide cæruleis, disco extus villosiusculo. *Stamina* 6: *Filamenta* fauci perianthii inserta, limbi laciniis opposita, conniventia curvata cærulea glabra: *Antheræ* approximatae, liberae, oblongo-lineares obtusae, basi emarginatae affixae, infernè quadriloculares, supernè biloculares poro duplici apicis dehiscentibus. *Ovarium* subcylindraceum utrinque attenuatum dilute viride glabrum, longitudine tubi perianthii, uniloculare, trispermum, ovulis erectis: *Stylus* filiformis glaber cæruleus, basi pallidiore pauloque crassiore, pariter ac filamenta curvatus, staminibus paulo longior: *Stigma* acutum. *Utriculus* tubo indurato perianthii inclusus, tenuis, juxta basin transversim abscedens margine lacero, calyptra apicem seminis maturescentis tegente. *Semen* unicum, maturescens elongatopyriforme teres tenuiter striatum, basi caudata funiculo capillari affixum. *Integumentum* simplicissimum nucleo arcte cohærens, apice area fusca notatum. *Albumen* semini conforme, dense carnosum, album, apice insculptum cavitate superficiali area fusca incrassata integumentum repleta. *Embryo*

CORYSANTHES.

Ord. Nat. *Orchideæ*.

Syst. Linn. *Gynandria Monandria*.

Perianthium ringens : *Galea* magna : *Labium inferius* 4-partitum, nanum, occultatum *Labello* maximo cucullato vel tubuloso. *Anthera* terminalis, unilocularis, semibivalvis, persistens : *Massæ Pollinis* 4, pulvereæ.

CORYSANTHES FIMBRIATA. *Tab.* 10.

Corysanthes fimbriata. *Prodr. fl. nov. holl.* 328.

In shady places, especially under rocks and large stones, near Sydney, and in other parts of the colony of Port Jackson.

DESC. *Bulbus* solitarius pisiformis radicem longam teretem fibris nonnullis alternis simplicissimis instructam terminans.

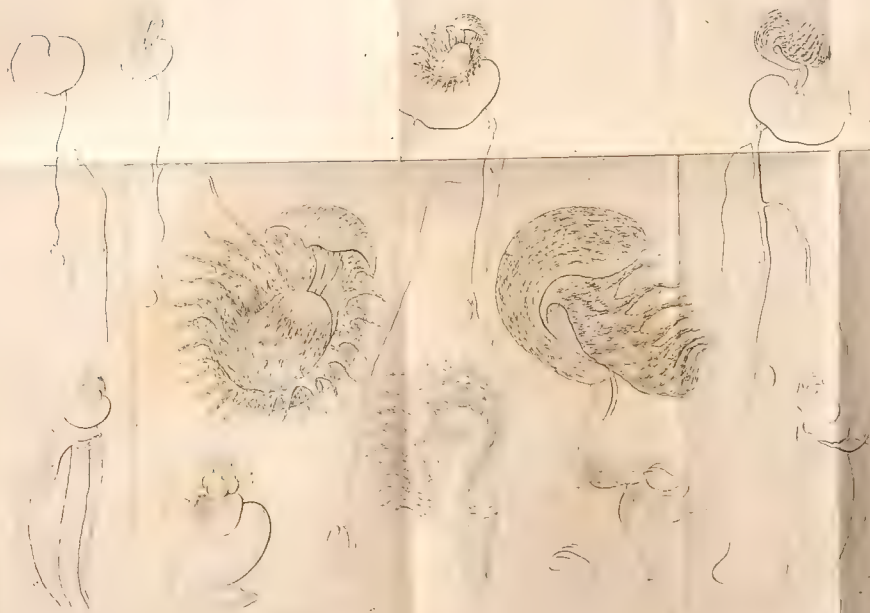
Folium unicum, quasi radicale, sed caulem brevissimum demersum, basi squama unica semivaginati subovata acuta instructum terminans, subrotundum mucrone brevissimo, basi altè cordata, lobis posticis rotundatis altero alterum equitante, explanatum horizontale, viride subtus dilutius, diametro subunciali, venosum venis dichotomis crebre anastomozantibus in nervum margini approximatum et parallelum desinentibus. *Flos* solitarius, pro ratione plantæ magnus, purpureus ; *ovario* intra folium sessili postice bractea semilanceolata erecta subenso. *Perianthium* petaloideum sexpartitum ringens : *Foliola tria exteriora*, quorum *Galea* hyalina cum maculis crebris purpureis inæqualibus, e basi erectiuscula arcuata argustiore, superne dilatata obovata magis concava porrecta, apice incurvo, marginibus longitudinaliter nudis ; *duo antica* cum lateralibus interiorum labium inferius descendenti-porrectum efformantia, subulata plana alba immaculata, ipsis basibus invicem connatis : *tria interiora*, quorum *duo lateralia* anticis exteriorum similia, e basi brevi porrecta adscendentia. *Labellum* maximum unguiculatum indivisum : *ungue* brevissimo erecto albo : *laminæ dimidio inferiore* adscendenti galeæ basi appresso, marginibus nudis inflexis tubum completum efformante, intus nigro sanguineo sursum dilutiore, paulo infra apicem albo virescenti rugoso subglanduloso ; *superiore* dilatato ovato concavo deflexo, dilute purpureo maculis numerosis confluentibus rufo-sanguineis, disco intus paulo infra apicem glandulis sessilibus sparsis ornato marginibus inflexis fimbriatis lacinulis subulatis æqualibus.

Columna fructificationis inclusa, brevissima, adscendens, alba carnosa, basi parum coarctata, apice posticè trifido dentibus lateralibus erectis subulatis intermedio antheri-

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Lythra pinnata.



fero. *Anthera* mobilis ovata membranacea purpurascens apice semibifido, unilocularis, apicem columnæ incumbens. *Massæ Pollinis* 4, per paria cohærentes, farinaceæ, apicibus affixæ glandulæ communi emarginaturam stigmatis operienti. *Ovarium* oblongum: *Stylus* cum basi columnæ conferruminatus: *Stigma* solutum, horizontale subrotundum, antice concavum, apice plica duplici coarctatum, antheræ subparallelum.

Obs. The three species of which this genus at present consists agree in their anthera being unilocular after bursting, in the singular relative proportions of the parts of the perianthium, and in habit; but in some points, generally of importance in this order of plants, they differ very remarkably, especially in the form of the labellum, which in one species is even furnished with a double calcar. *Corysanthes* may therefore be considered as affording a proof, and many others might be adduced, of the superior importance of certain modifications of the anthera to those of the labellum in Orchideæ.

AZOLLA.

Ord. Nat. *Marsiliaceæ*.

Syst. Linn. *Cryptogamia Filices*.

CHAR. GEN. *Flores* monoici.

MASC. Gemini, involuero clauso monophyllo membranaceo inclusi, (nunc solitarii femineum stipantes), ovati, biloculares, membrana exteriori transversim dehiscenti: *loculo superiore* corpusculis 9 vel 6 angulatis, circa axin perforatum apice demum apertum insertis: *loculo inferiore* sphaerico clauso, sub duplici membrana materia fluida (demum pulverea?) repleto.

FEM. In diversis alis ejusdem frondis solitarii, (nunc masculo inferiore stipati): *Involucrum* duplex, utrumque clausum membranaceum: *exterius* marium simile: *interius* ovatum, evalve; includens *Capsulas* numerosas evalves, 6—9-spermas, affixas pedicellis capillaribus e receptaculo communi baseos involucri interioris ortis. *Semina* angulata, radiculis exsertis.

AZOLLA PINNATA. *Tab.* 10.

Azolla fronde circumscriptione triangulari pinnata et semibipinnata: foliolis superioribus papulosis, radicibus longitudinaliter plumosis. *Prodr. fl. nov. holl.* 167.

In lakes and ponds, frequent within the limits of the colony of Port Jackson.

DESC. *Plantula* natans, facie *Jungermanniæ*. *Radices* axillares solitariae perpendiculares hyalinæ, primo aspectu simplicissimæ, per lentem plumosæ, novellæ calyptra glabra subulata tectæ. *Frons* semuncialis: *Ramis* distichis alternis approximatis parallelis teretiusculis; infimis haud raro pinnatis; superioribus sæpe instructis gemmulis ramulorum nonnullis axillaribus teretibus. *Folia* alterna undique imbricata: in *latere superiore frondis* trapezoideo-ovata, crassiuscula cellulosa, viridia passim rubicunda, margine exteriori submembranaceo, supra convexuscula papuloso-scabra, subtus lævia: in *latere inferiore* tenuiora lævia, subconformia vix tamen angulata. *Perichætia* in superficie inferiore frondis, prope basin pinnæ solitaria.

Obs. Mr. Bauer's very satisfactory figure and the generic character already given, will in a great measure supersede any farther description of the singular structure of this genus; on which, however, it appears necessary to subjoin a few remarks.

Admitting the parts of fructification to be accurately described, it is not easy to understand in what manner the male influence is communicated to the female organ. In one instance the turbid fluid, which usually fills the cavity of the lower cell of the supposed male organ, was found converted into a powder, and it is not improbable that this change ultimately takes place in all cases where the organ attains perfection. This powder may be supposed either to be discharged by the lateral rupture of the double coat of the containing cell, or a communication may at length be opened between this cell and the tubular axis of the upper cell, which, after the separation of its outer membrane, is open at the top; in this case the ejection of the pollen, or even of a fluid matter, may possibly be aided by the pressure or action of the angular solid bodies which surround this axis, and its dispersion would, no doubt, be assisted by the increased surface of its divided apex.

But whatever supposition may be formed respecting the œconomy of this part, it appears to me that as it is found in a second species of the genus, and of essentially the same structure, though slightly modified, the angular

bodies of the upper cell being only six in number, there can remain little doubt of its being really the male organ.

The genus *Azolla* was founded by Lamarck on specimens of the South American species entirely destitute of fructification, the remains of which only appear to have been seen more recently by Willdenow, who describes it as a "*Capsula unilocularis polysperma*."

REFERENCES TO TAB. 10.

AZOLLA PINNATA.

1. Plant of the natural size.
2. ——— magnified.
3. Leaves, magnified.
4. Male involucre, containing two flowers, magnified.
5. ——— empty.
6. Two male flowers.
7. A male flower divided longitudinally.
8. ——— deprived of its Calyptra, 9.
10. Lower cell of a male flower.
- 11 and 12. Different views of the contents of the upper cell.
13. Longitudinal section of the upper cell.
14. Inner female involucre.
15. Capsules, with their footstalks arising from the base of the involucre.
16. A capsule more highly magnified.
17. ——— opened transversely to show the position of the seeds.
18. ——— empty.
19. Seeds.

THE END.



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GENERAL REMARKS, GEOGRAPHICAL AND SYSTEM



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